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Report of the Chief of the Forest Service, 1958

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U.S. Department of Agriculture,
Forest Service,
Washington, D.C., October 28, 1959.

Hon. Ezra Taft Benson,
Secretary of Agriculture.

Dear Mr. Secretary:

It was a good year in forestry, with commendable progress. This, my annual report for 1958, recounts some of the progress as well as some of the problems we face.

Since the Forest Service was established back in 1905 it has promoted *sustained yield* forestry under *multiple-use* management. Underlying these basic tenets is the aim to make national forests serve "the greatest good of the greatest number in the long run." It is a tribute to our predecessors that the past has not only proved these principles sound, but a rapidly changing present is showing them to be more applicable now, even imperative. I believe the future will further prove their wisdom.

In theory, multiple use is simple. The home is an example found in everyday life. We use it for shelter, food, rest, and recreation. Some rooms are devoted to a specific use, others to several uses. On national forests it means many uses of the same land, ever mindful of the best use for the most people. In practice it is not so simple. Some of the people often want to use national forests for one purpose, while others want them for a different purpose. Here we have conflicts that must be resolved for the best interest of all.

When national forests were remote backwoods there was little need and less demand for multiple-use resource management. Today we have a fast-growing population in easy reach of these public lands, and demanding more and more from them. Thus, it becomes essential that we manage them more intensively and that we make multiple use work on as many acres as possible. To this task we dedicate ourselves.

While applying the principle we must also seek wider understanding among the public as to what multiple use is. For understanding and support are essential to its successful application.

So it is in these directions that we move: more intensive multiple-use management, greater public understanding of its need. Thus we assure that the multiple resources of these public lands—water, wood, wildlife, range, and recreation—will continue to serve increasing numbers of people in a growing economy.

Richard E. McArdle

Richard E. McArdle,
Chief, Forest Service.

Contents

	Page
INTRODUCTION	1
Some highlights of 1958	1
COOPERATION—STATE AND PRIVATE FORESTRY	3
Tree planting	3
Cooperative fire control	4
Cooperative forest fire prevention	5
Forest management	5
Pest control	5
Flood prevention	7
Rural development	8
FORESTRY RESEARCH	8
New uses and products	8
Forest economics	9
Seeking better management	10
Watershed studies	10
Range and wildlife habitat	11
Analyzing forest fires	12
Combating forest diseases	12
Insects—a perpetual threat	13
Aiding foreign forestry	13
NATIONAL FORESTS UNDER MULTIPLE USE	14
Recreation—major land use	14
Public hunting and fishing	16
Water from national forests	17
National-forest fire control	17
Timber for America	18
The grazing resource	19
Engineering—national forests	20
LANDS	21
National-forest lands	21
Land Utilization projects	22
PROGRAM PLANNING AND LEGISLATION	23
Legislative reporting	23
ADMINISTRATION	23
Manual and handbook	23
Personnel	24
Controls	24
Receipts and expenditures	24
STATISTICAL TABLES	26

This Report Covers Calendar Year Activities Unless Otherwise Identified. Where Records Are on a Fiscal Year Basis, They Are so Reported.

Report of the Chief of the Forest Service, 1958

Introduction

This was, in a sense, a year of reckoning. A time of looking back over 53 years to the beginning of the Forest Service, and of surveying the future, so far as is possible, to the year 2000 and beyond, to see whether a much larger population would continue to enjoy the abundance of forest products which present and past Americans have known.

The United States now has 7,000 more people than it had 24 hours ago—enough to make up a small town. It has 3 million more—a million more than are in Metropolitan Washington—than it had 1 year ago today. All of which definitely bears on forestry. Because the forest land area is not increasing by 1 inch; it remains the same or possibly a little less. This is no cause for alarm—if the implications are widely understood and acted on. The land available and suitable to commercial forestry in this country is sufficient, if used to its fullest potential. Putting it to full use is the direct challenge of all foresters and conservationists and the indirect challenge of every citizen.

Encouraging progress was evident during the year, but the fact remains that to this date all of the progress together does not add up to the massive forestry effort needed.

Forest Service work is broad and complex. Under management are some 181 million acres of national forests; the Service carries out a diversified program of forest and range research; and it cooperates with State and private forest-land owners to improve forestry throughout the country. In all of this there are many developments and individual contributions that would require volumes to enumerate. Without detracting from the smallest contribution, the following are considered some of the year's highlights.

SOME HIGHLIGHTS OF 1958

People talked private forestry.—How to improve the country's 4½ million farm and other small forest properties was the subject of a series of 24 regional meetings held throughout the Nation. Conducted by the Forest Service and State foresters, the meetings were designed to reach the people, go to actual owners and get their ideas on what is needed to raise timber production on these private lands that now produce so little of their potential.

Core of the problem is that small private holdings make up more than half the Nation's commercial forest land. Generally, these woodlands are producing far below capacity. As the Timber Resources Review indicated, timber production will need to be almost doubled to meet demands of a probable 300 million population by the year 2000. If that goal is to be reached, the 265 million acres in small ownerships need to be put under better management within the next 10 years.

More than 5,000 people attended the meetings; about half of them were woodland owners. In terms of attendance and lively discussion, the meetings met with a very favorable response from landowners and forestry, conservation, and community leaders.

Some effective work is under way in this field, and has been for many years, including limited Federal and State assistance, and increasing efforts by forest industries and consulting foresters to aid and inform woodland owners. The Forest Service's State and private work continues to make gains. Yet all public and private efforts are reaching only a limited portion of the small forest owners who need to improve their woodlands.

Ideas and suggestions at the meetings were recorded and are being analyzed with a view toward proposing a program that would embody a more unified and workable approach to this, the Nation's number one forestry problem.

A billion-and-a-half trees planted.—Evidence of some of the progress is seen in the record 1.5 billion seedlings planted in fiscal 1958. The previous year, 1957, was the first year in the Nation's history that a billion trees had ever been planted in 1 year. This notable achievement was marked by a ceremony on the White House grounds in which the President of the United States took part. That 1957 tree-planting highmark was pushed 42 percent higher in 1958. And 91 percent of this planting was on small forest properties, where the greatest need exists.

Still more recreation visits.—The ever-growing tide of people seeking outdoor recreation on national forests, which has been evident since World

War II, continued in 1958. There were 68.4 million visits, totaling more than 86 million man-day's use. This was about 7 million, or 12 percent, more visits than in 1957, and a 100-percent increase within the past 8 years. This use—including picnicking, camping, hunting, fishing, swimming, boating, and skiing—is by far the fastest growing activity on these public forests. Operation Outdoors Part 1 is helping to accommodate expanded use, but is falling behind because visits are exceeding anything foreseen a few years ago. That program was planned to take care of an estimated 66 million visits by 1962, but actual visits surpassed the prediction 3 years early.

The billionth dollar came in.—On October 28, the billionth dollar in national forest receipts was deposited in the Federal Treasury—hard cash proof that multiple-use management and protection of these public forest lands is paying off. This represented income of the past 53 years, from the time the Forest Service was established in 1905. It included receipts from the sale of timber, grazing permits, and special land use fees. Although it took 53 years to collect the first billion, if receipts continue as they have in recent years, national forests will return their second billion to the Treasury within 10 years. The many other benefits not measured in dollars which people enjoy from national forests are also rapidly increasing.

National forest timber harvest steady.—Though the timber industry was still emerging from a slight depression, timber cut on national forests amounted to 6.4 billion board feet—8 percent below the 1957 cut. Receipts were $86,274,611. It was a record year in timber sales: 13.3 billion board feet, including a 5.3 billion pulpwood sale in Alaska to be cut over a 50-year period. New inventories and management plans were completed on additional working circles, and the access road program was making progress.

Final TRR report published.—The Timber Resources Review, a 3-year on-the-ground survey of the Nation's forestry resources, was published in final form in March under the title "Timber Resources for America's Future." The most thorough study of the country's timber situation ever undertaken, this 700-page hardcover book had a very favorable public reception, generating much comment and discussion on forestry in general. One of its significant conclusions was that America's expanding population will require nearly twice the present production of wood by the year 2000, and that the real key to future timber supplies lies in the hands of the 1 out of every 10 families who own small forests.

Forestry research advancing.—Somewhat like a tree's growth, forestry research is moving up steadily. Some of the year's progress included: More basic research facilities; successful adaptation of antibiotic drugs to the battle against the white pine blister rust disease; producing more water by manipulating forest cover and building snow fences; improved hybrid seedlings; artificial revegetation of deer and other big-game ranges; and increasing markets for low-grade hardwoods and waste material.

Another record year in forest fire control.—An outstanding fire control record set in 1957 was improved upon in 1958. On all forest land—public and private—only 3¼ million acres burned, compared with the immediate past 5-year average of about 7 million acres annually. Most of the 1958 fire damage was on State and private lands, and most of that within the 11 Southern States. On the 199 million acres protected by the Forest Service, 116,000 acres burned—down from 141,000 acres in 1957. In addition to improved fire-fighting methods and equipment, much credit for these records is due the cooperative prevention efforts under the Smokey Bear symbol.

Because more than half of the Nation's forest fires occur in the South, a new prevention program designed specially for this region was set up. It will operate as a supplement to the overall national Cooperative Forest Fire Prevention Campaign.

First forest conservation postage stamp.—The country's first forest conservation postage stamp was brought out this year by the Post Office Department, further spreading the message of conserving valuable forest resources. The new 4-cent stamp was issued October 27, at Tucson, Ariz., on the 100th anniversary of the birth of Theodore Roosevelt, one of the Nation's earliest and most effective forest conservationists. Tucson was chosen as the place for the first-day issue because the American Forestry Association, long one of the leading forces in forest conservation, was holding its annual meeting there.

Faster land surveying.—Through a process worked out by Forest Service engineers, aerial photography may replace the transit and chain in much of the land surveying of the future. Photogrammetry (surveying and mapping from photographs) has been successfully adapted to land surveying. It can mean that a big job of surveying and establishing accurate national-forest boundaries can be speeded up considerably. The process enables land surveying—especially on large areas—to be done much faster, with fewer men, at no greater cost.

Cooperation—State and Private Forestry

Assistance to private forest-land owners is provided through cooperative Federal-State programs.

For the year in this area of work, outstanding accomplishments were made in tree planting and the prevention and control of forest fires. Also, solid gains were marked up in cooperative forest management, pest control, flood prevention, and rural development work.

TREE PLANTING

The number of forest and shelterbelt trees planted annually throughout the country has doubled in the past 5 years, reaching the commendable record of 1,554,700,000 trees in fiscal 1958. These were planted on 1,568,700 acres, the average planting being 991 trees per acre. Most of the planting—86.5 percent—was on privately owned lands.

The 1958 planting surpassed by 34 percent the 1957 record of 1,170,990 acres. It more than doubles the 1953 total of 715,548 acres; more than triples the 1950 planting of 497,507 acres; and is more than 10 times the 138,970 acres planted in 1930.

Florida Led the Way

Florida led the way with 206,594 acres planted; Georgia was a close second with 191,947 acres; Mississippi and Alabama, respectively, were next with 132,731 and 114,046 acres.

Federal agencies planted 137,853 acres, which represented an increase of 27 percent over 1957. About 89,000 acres of this was national-forest planting, and 28,000 acres were lands administered by the Department of the Interior. State and other non-Federal public agencies planted 74,534 acres, an increase of 15 percent.

Reflected in the impressive increase is a growing interest in tree planting by private landowners as well as tree nursery expansion. In recent years nurseries have been hard put to supply the seedlings wanted. State forestry departments, industry, and commercial operators have all expanded nursery capacities to meet the growing demand.

Most tree planting is done by setting out seedlings by hand or by machine. In 1958 a total of 240 nurseries supplied more than a billion and a half seedlings. Number of nurseries had increased by 50 since 1957: Commercial nurseries by 29, State nurseries by 9, soil conservation district nurseries by 7, industry nurseries by 4, and Federal nurseries by 1.

More Direct Seeding

A considerable increase in direct sowing of tree seeds by hand and by aircraft was apparent for the year. About 81,000 acres were sowed, compared with 32,693 acres in 1957. The growth of this reforestation method is due to development and use of a chemical dip which coats the seeds and prevents birds and rodents from eating them before they have time to germinate. In localities where climate, soil, and species make direct seeding practical the method will hasten reforestation.

Federal programs to help States and private owners reforest their land continue to expand, under the Clarke-McNary Act of 1924 and the Agricultural Act of 1956.

Conservation Reserve

Farmers agreed to plant trees and shrubs on approximately 550,000 acres of land withdrawn from agricultural production under Conservation Reserve (Soil Bank) contracts. Final signup date was April 15, 1958. Since then, participation in the 1959 program indicates that 800,000 acres of land withdrawn from agricultural production will be planted to trees under 1959 contracts.

Under formal agreements, State forestry agencies in 38 States furnished planting stock or technical assistance, or both, to farmers planting trees under Conservation Reserve. Some other States provided assistance as part of other cooperative programs.

In fiscal year 1958, Soil Bank funds enabled States to grow or buy 343 million seedlings for Conservation Reserve planting. Next year the figure should reach 500 million.

States continued to expand nursery capacity under projects started in 1957 and began building three new nurseries with Soil Bank funds. By 1960 State nurseries enlarged or built with Soil Bank funds should be producing 700 million seedlings per year.

State foresters furnished 1,187 man-months of technical forestry assistance to participating farmers and the County Agricultural Stabilization and Conservation committees and offices. Soil Bank financed about 77 percent of this assistance, and the Cooperative Forest Management Program paid about 23 percent.

Assistance to States for Forestation

Under title IV of the Agricultural Act of 1956, 16 States received Federal financial assistance in forestation of nonstocked or understocked commercial forest land. During fiscal year 1958 forestation work was completed on 59,607 acres: Planted—37,022 acres; seeded—11,785 acres; treated to encourage natural seeding—10,801 acres. The Federal Government paid $439,633 of the total cost of $1,098,219. This is the first year funds were available for this program.

Nursery Stock

Production and distribution of seedlings under the Clarke-McNary Act reached a new record in fiscal 1958—764 million. Forty-five States plus Hawaii and Puerto Rico cooperated in this program.

The Federal Government paid $1,131,180 and the States contributed $1,671,919 toward financing this work. Receipts from sale of seedlings totaling $4,562,275 were also used to finance this program.

To encourage tree planting, the price of planting stock is kept as low as possible. In 1958 the average selling price was $5.33 per thousand.

COOPERATIVE FIRE CONTROL

Area of State and privately owned forest land burned over by fire in 1958 was the smallest yet—less than 3 million acres. It was 10 percent below the previous record low of 1957, and accomplished in spite of a 9-percent increase in the number of fires started. The progress is evident when it is considered that during the 5-year period 1953–57 an average of about 7 million acres were swept by fire annually.

On all forest land in the country, both public and private, there were 97,910 fires reported in 1958, comparing with the 1957 alltime minimum of 83,392.

The encouraging reduction in area burned is the result of increased prevention effort with accompanying public awareness of the need for being careful, plus intensified protection by State and private agencies.

Protection was extended to 1.2 million acres of non-Federal forest land. This brought the total area under organized protection to 397 million acres, leaving about 38 million acres still unprotected.

Now included in the Cooperative Fire Control Program are 45 States and Hawaii. Nebraska joined the program in 1958. Arizona, Kansas, and Wyoming do not participate.

In fiscal 1958 the Federal Government contributed $9,410,078 toward the total cost of the program, which was $52,237,643. The increase of almost $7 million in total expenditures over 1957 was due to increased State and private contributions.

Fire Season Severe

The 1958 fire season was longer and more severe than normal. The Rocky Mountain and west coast regions had very difficult weather conditions. California had the highest incidence of lightning in the history of the State. In addition, it had the driest season in 108 years. The Northwest also had more lightning fires than usual.

Despite progress in the control of forest fires, the picture is not all rosy. Even the good 1958 record still adds up to an average 268 fires a day, or 1 every 5½ minutes. Millions of acres still receive too little or no protection. On the 38 million acres totally without organized protection, fires that start are not detected until they have grown large and already done vast and costly damage. Records show that 5 percent of the unprotected lands burned over in 1958, while only one-fourth of 1 percent of protected lands burned. Thus, the unprotected forest lands burned at a rate 21 times greater than did lands under organized protection. Too many fires blow up or otherwise get out of control.

An additional 200 million acres are not adequately protected to meet possible disastrous fires. Men and equipment are spread too thin in places; more lookout towers are needed; and communication systems are outmoded.

Besides the inadequate protection, firefighting agencies also find the continuing large number of incendiary fires disheartening.

Still causing most forest fires nationwide are incendiarists, debris burners, and careless smokers, in that order. For 1958, the deliberate woods burners started 19,581 fires; debris burners, 18,316; and smokers, 14,171. Lightning started 10,828.

Battelle Report

The Battelle Memorial Institute completed a 2-year study of the Cooperative Forest Fire Control problem. The Institute recommends intensifying protection to meet the greater risks from more use of the woods, greater hazards on the ground, and higher values of the forest resources. It developed criteria for determining the total cost of protection and the sharing of that cost by Federal, State, and private agencies.

Program Review

The Association of State Foresters and the Forest Service agreed to make a joint review of the recordkeeping in the Cooperative Fire Control Program—CM–2. This was recommended by the Battelle report, as follows:

> This study was limited by the data presently available. The estimates given apply to the present situation. As better data become available and as water, recreation, and timber continue to increase in importance, reestimates are essential. In the meantime, a cooperative effort between the State foresters and the Forest Service should be initiated to collect more detailed and consistent data related to fire experience and fire-control costs.

Excess Property

Many States obtained excess Federal property, for use in Cooperative Fire Control Programs. Needed equipment was transferred to the States under provisions of the Federal Property and Administrative Services Act of 1949. This has helped provide additional protection for non-Federal forest land.

COOPERATIVE FOREST FIRE PREVENTION

This nationwide prevention program, symbolized by the familiar and popular Smokey Bear, had its most successful year, reaching more people than ever before. Smokey continues to grow in solid prevention accomplishments and in popularity, especially with children. For the second year, total number of fires—on all forest land—was under the 100,000 mark (97,910). And area burned was the smallest yet.

Top Public Relations Award

In recognition of the fine CFFP public relations work for 1958, the Smokey campaign won the coveted silver anvil award from the American Public Relations Association. One of these top awards went to the Smokey Bear campaign as the best in the agriculture classification.

This educational campaign, aimed at preventing man-caused forest fires, is supported by the Association of State Foresters and the Forest Service and sponsored by The Advertising Council, Inc.

Golden Smokey Awards

President Eisenhower awarded the first four Golden Smokey statuettes at a conservation ceremony on the White House lawn, May 8. Recipients of the first Smokey awards for outstanding accomplishments in fire prevention were The Advertising Council, Inc., American Forest Products Industries, Inc., American Forestry Association, and Judy Bell, 14-year-old girl representing Capitan, N. Mex., and the children of America who have helped so much to skyrocket Smokey to national and international fame.

One Message to 100 Million

In cooperation with the Native Sons and Daughters of the Golden West, a Smokey Bear float was built and entered in the Tournament of Roses Parade in Pasadena, Calif., January 1, 1959. It won the Governor's Trophy in competition with more than 60 floats. For the first time—through attendance at the parade and TV coverage—a single forest fire prevention message reached more than 100 million people.

The commercial educational program, in which producers pay a royalty to sell Smokey products such as ashtrays, children's T-shirts, dolls, and other novelties, showed some expansion for the year, with eight new licenses for products. Royalties on licensed products totaled $22,000—up $2,000 from last year.

International Figure

Smokey continued to gain stature as an international figure. Canada's Forest Fire Prevention Program, supported by the Canadian Forestry Association, is well under way. Mexico and many South American countries made more use of Smokey material. "The Story of Smokey Bear," a Little Golden Book, was published in French, Swedish, and Norwegian. Cambodia copied the 1956 U.S. Smokey poster, translating the fire prevention message and using native animals. The Smokey Bear comic books are reprinted in Spanish.

FOREST MANAGEMENT

Colorado reentered the Cooperative Forest Management Program in fiscal 1958, bringing the number of cooperators to 45 States and Puerto Rico. Only Alaska, Arizona, Hawaii, New Mexico, and Wyoming were not included in the program and did not have foresters to advise woodland owners.

With increased Federal and State appropriations, more foresters helped a larger number of small owners manage more forest land than in any previous year. A total of 434 foresters assisted 58,752 owners, mostly small owners, in improving management of 3½ million woodland acres and marketing 445 million board feet of timber products having a gross value of about $10,000,000. Assistance included: Plans for timber production and other special products such as naval stores; marking timber for sale; protection from fire, pests, and cattle; tree planting; and increasing wildlife and recreational benefits. Advice was given to 5,929 small processors on more efficient methods and new techniques for operating their plants.

Congress appropriated $1,510,000 for carrying out this program. Cooperating States paid $1,749,556.

Specialized Assistance

Public and private agencies, forest industries, colleges, universities, and large forest-land owners received specialized technical forestry assistance. The Forest Service helped conduct or participated in training schools to give Federal, State, industrial, and consulting foresters information on the latest techniques of management, utilization, log grading, and continuous forest inventory.

Naval Stores Program

The Forest Service cooperated with the Agricultural Conservation Program Service in the Naval Stores Conservation Program. More than 2,641 gum naval stores producers participated in the program. Although these producers represent only 65 percent of the total number of producers, they worked 27.2 million faces, or 86 percent of the entire naval stores crop.

PEST CONTROL

The Forest Service makes surveys to detect destructive diseases and insect outbreaks, controls these pests on national forests, participates in co-

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operative Federal-State-landowner cost-sharing control programs, and gives technical assistance to other Federal agencies in their control work.

Diseases

Control of forest-tree diseases is accomplished through preventive measures as well as direct control work. Training sessions stressed (1) planting techniques, (2) selection of the right species for particular areas, (3) removal of disease-susceptible trees through commercial timber sales and through timber stand improvement work, and (4) direct control methods.

White pine blister rust control work was done in 33 national forests in 6 Forest Service Regions—Eastern, Southern, North Central, Northern, Pacific Northwest, and California. Federal-State-landowner cooperative work to control this disease was carried on in 26 States. Need for control was determined by surveys covering 467,659 acres of national-forest land and 3,534,905 acres of non-Federal land.

Removing and destroying ribes (currants and gooseberries), the rust's alternate host, is a well-established method of controlling white pine blister rust. In 1958, 6.5 million ribes were eradicated from 124,547 acres of national-forest land, and 6.6 million ribes were removed from 264,643 acres of State and privately owned land.

States, counties, towns, and private landowners continued their excellent financial support of the cooperative white pine blister rust control program to eradicate ribes on non-Federal land. Their contribution amounted to 70 percent of control costs exclusive of leadership and technical direction.

As a supplementary means of controlling white pine blister rust, the Forest Service, in cooperation with a pharmaceutical company, has been testing since 1954 various formulations of an antibiotic fungicide called Acti-dione. Results on western white pine in north Idaho have been most encouraging. By spraying 150 to 200 parts per million of Acti-dione in No. 1 stove oil on the base of infected white pines, all infection on them is killed. As a result of these encouraging tests, Acti-dione was applied to 277,550 trees in national forests and 16,916 trees on State and privately owned land in north Idaho. In addition, extensive tests to determine the immunization properties of Acti-dione and other promising antibiotics were started, and plans were laid to test in 1959 the effectiveness of aerial application of the same fungicides.

Another approach to this blister rust problem is the production of rust-resistant pines. During 1958 a forest genetics center was completed and put in operation, in cooperation with the University of Idaho, Moscow, Idaho. This center includes office and laboratory space, a greenhouse, and 42 acres of land. Work at this center is concentrated on western white pine. Cooperative work to produce resistant eastern white pine was continued with the University of Wisconsin at Madison, Wis. Genetics work to produce resistant sugar pine was stepped up in California and Oregon.

Oak wilt continues to threaten the forests in the East and Midwest. In 1958 Arkansas joined the cooperative control program. Kentucky, North Carolina, Virginia, West Virginia, and Pennsylvania continued in the program. In these six States aerial surveys to detect oak wilt were made over 35.3 million acres of non-Federal land. Treatment was applied to the 3,609 infected trees located. Aerial surveys over 1.5 million acres in 3 national forests in Kentucky, West Virginia, and Virginia turned up only 12 infections. These trees were treated promptly to prevent spread of oak wilt.

The Forest Service provided technical direction for 16 disease control projects on lands administered by the U.S. Department of the Interior.

Insects

Insect control work was carried out on 65 national forests and on State and privately owned forest land in 26 States. To reduce spruce budworm damage, DDT was aerially sprayed over 1,250,111 acres in Arizona, Maine, Minnesota, and Oregon. Of this total, 849,134 acres were in national forests, 33,000 acres were in U.S. Department of the Interior lands, and 367,977 acres were in non-Federal lands.

DDT or other appropriate insecticides were applied aerially over 7,086 acres of national-forest land to suppress small outbreaks of Saratoga spittlebug, Great Basin tent caterpillar, Douglas-fir tussock moth, sawflies, pine weevils, and other pests. Appropriate insecticides were aerially applied to trees on 657 acres of national forests to suppress small outbreaks of several other species of forest insects. To kill destructive bark beetles, 770,158 infested trees, cull logs, and stumps on national-forest land and 9,331 trees and stumps on non-Federal land were chemically treated.

Forest pest control funds were used to treat 9,881 bark beetle-infested trees and 11,360 acres for control of other pests on lands administered by the U.S. Department of the Interior. On most of these projects the Forest Service provided technical assistance to the Department.

In addition to these direct control measures, more than 1 billion board feet of dead, dying, infested, or insect-susceptible timber on the national forests was cut and sold to prevent or suppress insect outbreaks.

Aerial spraying costs dropped from $1.00 in 1957 to $0.75 per acre in 1958, as the result of improved techniques and sharp competition for contracts.

In applying insecticides, increased care was taken to prevent possible adverse side effects. The Forest Service worked closely with officials of the U.S. Fish and Wildlife Service and State fish and wildlife agencies to minimize damage from spraying operations.

A cooperative study by the Forest Service, U.S. Fish and Wildlife Service, and Montana State Fish and Game Department showed that aerial spraying with DDT insecticide at a rate of 1 pound per acre caused no permanent damage to trout and the aquatic insects on which trout feed.

FLOOD PREVENTION

Public Law 566 Projects

The Forest Service helps local organizations plan and carry out watershed protection and flood prevention programs under Public Law 566 (83d Cong.), as amended.

During 1958 the Forest Service worked with State foresters, U.S. Soil Conservation Service, and local sponsors on improvement plans for 245 small watersheds. Plans were approved and installations authorized on 79 projects; 38 of these include stepped-up programs for improvement of forest lands.

On 1,148 acres of privately owned watershed land, 1,082,750 trees were planted. Technical forestry assistance was given 167 landowners and operators. Protection from forest fire was extended or strengthened on 126,195 acres. Other watershed improvements on 2,678 acres of woodlands include stand improvement and protection from grazing.

On national-forest rangelands, improvements include management on 1,154 acres, building 69 miles of fence, chiseling on 40 acres (subsurface plowing to improve soil-moisture relationships), pitting on 200 acres (digging shallow holes to hold water), and reseeding 25 acres.

Pilot Projects

The watershed demonstration or pilot program on 58 small watersheds, authorized in 1954, is nearing completion. About 90 percent of the forestry measures planned for national-forest and non-Federal forest lands have been installed.

In 1958 the Forest Service, State foresters, U.S. Soil Conservation Service, and local project sponsors worked together on 29 projects. On 3,126 acres, almost 3.1 million trees were planted. Technical forestry assistance was given 603 landowners and operators. Protection from fire was extended to 18,400 acres. Improved forest management was provided on 15,900 acres. Other accomplishments were gully control of soil stabilization on 1,384 acres, erosion control for 12 miles of Forest Service roads, and building 41 miles of fence to prevent grazing damage.

Prevention Projects

Work was continued on seven flood prevention projects, authorized under the Flood Control Act of 1944. During 1958, 46.7 million trees were planted on 49,760 acres of eroding and flood-producing lands. Ninety-seven percent of these trees were planted on the Yazoo and Little Tallahatchie projects in Mississippi through the combined efforts of the Forest Service, Soil Conservation Service, Agricultural Conservation Program Service, Conservation Reserve, and local farmers.

Technical forestry assistance was given 2,456 landowners and operators. Improved forest management was extended to 42,260 acres of privately owned land. Fire prevention efforts were intensified on 80,580 acres of national-forest land; this included building 12 miles of roads and 42 miles of trails into inaccessible areas, 30 miles of firebreaks, and 61 landing spots for helicopters.

Emergency Flood Prevention

Emergency measures were applied on six burned-over areas of national-forest land in southern California. About 50,600 acres were aerially seeded to quick-growing grass and mustard. Fills and roadbanks on 97 miles of Forest Service roads were given emergency treatment to prevent movement of road material into stream channels.

Other Federal, State, and local agencies cooperated in seeding 13,000 acres of denuded non-Federal land and installing other measures such as channel clearing, debris basins, and road drainage.

River Basin Studies

The Forest Service made its final report to the Corps of Engineers on proposed Federal flood control and water development projects in the Columbia River Basin. This report on probable effects of these developments on national-forest and non-Federal forest land was included in the "Columbia River Basin (308) Review Report" by the Corps of Engineers. Most of the Forest Service recommendations were included in the plan proposed by the District Engineer, Corps of Engineers.

Forestry phases of the Lower Mississippi River and Tributaries Study were completed.

Field studies of the forest-land aspects of water control and water supply requirements in the Potomac River Basin were started.

The Forest Service worked with other agencies in the U.S. Department of Agriculture in reappraisal of projects authorized under the Upper Colorado Storage Act. Forestry impacts of three projects were determined.

Studies of the forest-land aspects of the Cape Fear River (North Carolina) flood control program were completed.

Plans were made for the Forest Service to assist the Southeast and Texas River Basins Study Commissions, authorized by Congress in 1958.

RURAL DEVELOPMENT

Through Federal-State cooperative programs, technical forestry assistance was given to forestland owners and processors of forest products in 102 rural counties in 30 States and Puerto Rico. These counties are pilot counties or are included in demonstration areas in the Rural Development Program. About half of the land in these counties is forested. The Forest Service had a full-time man in two regions working on forestry aspects of this program. In other regions, a man was devoting part time to rural development.

The Forest Service and State forestry departments, in cooperation with the Agricultural Conservation Program Service, helped farmers plant trees. For example, landowners in Chesterfield County, S.C., planted 6 million trees through the Conservation Reserve Program contracts.

Local planning committees, the Forest Service, State forestry agencies, and business organizations work together to encourage the development of new forest industries or the expansion of existing plants. In some areas forestry agencies collect data on timber supplies, and industry, business, or local planning committees publish and distribute the material. This information is helpful to industries needing such raw material and often helps establish new forest industries to use local products and employ rural people.

In 1958 the West Virginia Bankers' Association published a brochure entitled "Forest Fortune," which describes the hardwood resources and operating conditions in the central part of the State. This booklet shows that the area has enough raw material to supply additional mills and plants as well as existing forest industries. Also, labor, power, transportation, and industrial sites for successful operation of timber are readily available. Material for the publication was prepared by the Forest Service, West Virginia Conservation Commission, and other public and private agencies.

Virginia's Division of Planning and Economic Development published "Mountains of Hardwood." This booklet gives information on southwest Virginia's timber and other resources and facilities needed for expanding and developing forest industries.

Forestry Research

Better forestry begins with research. In laboratory and experimental forest, solutions to practical problems are sought and found through a balanced program of basic and applied experiments. Research has played a big role—paying off many times its cost—in the broad forestry advances of the past 20 years. As more intensive forestry is practiced, both on private and public lands, an accelerated program of research is essential.

Forest Service research, cooperating with other Federal agencies, States, colleges, industries, and individuals, helps all forest interests. When a new use for wood is found, a better species of tree developed, or a new and cheaper way to control a forest pest is discovered, the private tree grower benefits along with public forests.

For example, a farmer's fencepost may now last up to 10 times longer if treated with a wood preservative developed by Forest Service scientists. Experimental strip cutting of mountain forests produced a 24-percent increase in water yield. A fungicidal spray shows great promise for controlling the southern pine cone rust. A pulping process utilizing low-grade trees is opening more markets for scrub and defective hardwood timber. These and numerous other research results help the average citizen, the timber grower, the processor, the seller and user of wood.

Other examples of forestry research under way during 1958 follow.

NEW USES AND PRODUCTS

Studies to increase value and service life of forest products are centering more on inherent characteristics of wood itself, and significant accomplishments in fundamental research were achieved. But advances were also made in developing products and processes that will use more low-grade and cull materials and wood residues.

Technical Developments

Electronic microscopy has aided in understanding the principles of adhesion of glues to wood; this is important in the manufacture of modern glued products. The Forest Products Laboratory has developed a soil block test, now adopted by the woodworking industry, as a measure of toxicity of wood preservatives. Evaluation of the strength properties of both treated and nontreated telephone poles will permit improvement and updating of pole standards and specifications and treating schedules. Studies of the development of internal stresses in wood as it dries will help reduce expensive drying time and improve wood quality.

Use of Low-Grade Hardwoods for Pulp

Tests of pulps containing large quantities of both northern and southern hardwood show that papers with many desirable properties can be

made from such pulps; for instance, a newsprint furnish consisting of 75 percent hardwood pulp can be made efficiently on a modern high-speed paper machine and gives papers reasonably close in average properties to those of commercial newsprint. Similarly, sulfite pulps made from mixtures of hardwood species were bleached by a simple three-stage process to yield a pulp stronger than seven of eight random samples of commercial bleached coniferous sulfite and hardwood sulfate pulps. Already well under way in many pulp plants, the use of hardwoods will be considerably expedited by research findings such as these.

Outlet for Low-Grade Douglas-Fir

Literally billions of board feet of large old-growth Douglas-fir timber have been considered practically worthless because the trees have been affected with the fungus *Fomes pini*, and the wood had a characteristic appearance known as "white pocket." Studies now indicate that plywood constructed of veneer containing this material is comparable in its properties to the usual grade D veneer plywood, and that plywood using the grade D veneer is comparable to plywood constructed of clear veneer in a number of important properties. As a result of this work, commercial standards for Douglas-fir plywood have been changed so that it is now possible to use large quantities of this "white pocket" material that was formerly discarded. This research finding will have a far-reaching effect on timber utilization on the west coast.

New Use for Insect-Killed Spruce

The possibility of an industrial market for large volumes of insect-killed Engelmann spruce timber in the western forests has been opened up by another new product. Forest Service scientists have experimented with a flake-type particle board having excellent strength properties and dimensional stability. The development of this use of dead trees has now progressed to the successful pilot plant stage.

Packaging Advance

In cooperation with the Air Force, Forest Service scientists have shown another way of reducing shipping costs. Experiments with a glass fiber-resin coating of fiberboard boxes have resulted in improved resistance to water, rough handling, and stacking load. These improvements will enable coated fiberboard to compete costwise with other board. Coated fiberboard boxes originally packed for domestic use can now be shipped overseas without repacking.

FOREST ECONOMICS

This field of research is concerned with forest surveys to appraise the timber situation and trends in the various States and the Nation as a whole, development of economic guides for determining the profitability of timber growing and other forestry activities, and improvement of marketing practices and expansion of market outlets for forest products.

More Inventories Completed

Seventy million acres of forest land were covered last year by the nationwide forest survey to obtain basic information on area and condition of forest land, amount and quality of timber resources, rates of timber growth and depletion, and other resource information basic to public and private forestry programs. Of the 782 million acres of forest land in the United States, all but 236 million acres, located largely in Alaska, have been inventoried at least once. In most parts of the country resurveys are now being made at about 10-year intervals.

More Pine, Less Hardwood

As an example of Forest Survey findings in the Southern States, recent data for Mississippi show that softwood growth is now 85 percent greater than the cut. Hardwood growth, however, is only 80 percent of the annual cut. During the 8 years since the last previous inventory, volumes of softwoods increased 8 percent while hardwood volumes declined 21 percent. This increase in softwood volumes is attributed to stepped-up management programs on forest industry and public lands. The decline in hardwoods is mainly the result of land clearing for agriculture, heavy cutting, and drought-induced mortality. Details are available in a Forest Survey release of the Southern Forest Experiment Station, "Mississippi Forests."

Inventory Techniques Improved

Recent improvements in forest survey techniques included new procedures for classifying the condition of forest stands and stand treatment needs. Composite aerial volume tables developed in the Southern States are being tested in various areas. Other photo volume tables were developed for use in Alaska, where most timber inventory work requires aerial methods.

Newsprint in Lake States

Economic studies completed during the year included a comprehensive appraisal of the technical and economic feasibility of using aspen and other Lake States hardwoods for newsprint and other pulp and paper products. This study indicated that production of newsprint in the area at this time is economically questionable. On the other hand, expanded production of such products as market kraft pulp and cold soda pulps made from hardwoods appears to be both technically and economically feasible.

Land Use for Timber or Forage

Studies of the conflict between timber growing and livestock production in northwestern California are helping provide landowners with an economic basis for deciding where to grow timber and where to convert forest land to grass. On good quality timberland, for example, prospective long-run returns are greater if the land is devoted to timber production. Medium quality timberlands on southern or western exposures yield more prospective income in grass, whereas on northern or eastern exposures this class of land generally yields more income from timber.

SEEKING BETTER MANAGEMENT

The task of forest management researchers is to develop the scientific basis and technical procedures for the management of timber. Their aim: to learn how to grow continuous crops of the best timber in the most profitable way.

Trees for Carolina Sandhills

Research has provided the answers to the question of how to convert some 3 million acres of unproductive sandhills in the Carolinas and Georgia to valuable pine plantations. These lands originally supported pine but came up to scrub oak following logging and fire. Studies were undertaken to find out why attempts to reestablish pine had failed, and how favorable conditions could be created for successful survival and growth of pine. It was learned that planting can succeed if: (1) vigorous longleaf seedlings are used; (2) the site is cleared or plowed, and time then allowed for the soil to settle; (3) the trees are planted in December or January; and (4) sprouts of oak or other competitors are killed no later than the second season after planting.

Spray Kills Unwanted Trees

On an 800-acre experimental tract in Missouri, spray applied from aircraft to release young pine for better growth adequately controlled the overtopping cull hardwoods. At least half of the hardwoods were dead in 2 years and many of the others were weakened. The pines grew 50 percent more the second season than did similar pines where no spraying was done. None of the pines were killed by the spray; some lost their needles but recovered. The successful spray consisted of 2 pounds of 2,4-D or 2,4,5-T in 5 gallons of fuel oil, applied at the rate of 5 gallons per acre.

Predicting Young Forest Growth

Research has shown that dense stocking in ponderosa pine stands causes unfavorable conditions which are responsible for stunted height growth. When this occurs the potential of the site may be incorrectly estimated. Site index curves which allow for overstocking have accordingly been constructed for the Inland Empire Region of eastern Washington and western Idaho. These and associated yield tables will make it possible to evaluate future growth of young forests in this region more accurately and thus provide a better basis for management.

Thinning Ponderosa Pine

Studies of thinning dense ponderosa pine thickets in the Black Hills of South Dakota in 1931–32 have now pointed the way to effective and practical treatment of these stagnated stands. Stands averaging 1 inch in diameter should be thinned to about 550 trees per acre; those averaging 2–3 inches to 425 trees per acre; and those averaging 5 inches to 300 trees per acre. This schedule will concentrate the growth on trees which will be merchantable either as an intermediate or final crop.

Pruning Improves Hardwoods

The quality of sugar maple and black cherry, premium hardwoods of the Northeast, can be improved by early pruning. A field study over a 20-year period in northwestern Pennsylvania demonstrated that following close pruning of these species clear wood, without decay or dead and stained spots, was produced. The pruning did not stimulate serious epicormic branching.

WATERSHED STUDIES

Watershed research is particularly important to management of the national-forest lands because most of them are high water-producing lands, providing this all-essential resource for homes, industry, and agriculture. The objective is to reduce sediment and flood damage, prevent erosion, raise both quality and quantity of water wherever possible, and generally to harmonize the use of this vital resource with other national-forest resources to best serve the most people.

Thirsty Saltcedar Studied

Along streambanks and on flood plains of the Southwest, the aggressive, tenacious tamarisk (saltcedar) consumes large quantities of water needed for irrigation and other productive uses. Research has revealed some weaknesses of saltcedar that may help to eliminate it from these critical areas, and to convert the vegetation to plants consuming less water. For example, tamarisk seeds germinate only in water or on continuously wet soil. The seedlings are slow to start growth and must have saturated soil for a week or more following germination in order to survive. Drought or high water will generally kill them, and the seedlings do not develop in maximum air temperatures of less than 82°.

Plant Cover Affects Streamflow

Based on laboratory and field research, treatments have been developed and are being applied on two pairs of watersheds of the San Dimas Experimental Forest in southern California, with the aim of increasing yield of usable water without adding to flood and erosion hazard. First results look promising.

On one of the watersheds, high-water-using canyon-bottom trees are being removed. After only 15 acres of a planned 80 acres were cleared, preliminary data indicate a small but significant rise in streamflow during the summer. On another watershed, the brush on deep soil is being deadened with hormone sprays to permit conversion to a grass cover. These treatments were started after much detailed preparatory study of watershed behavior factors and calibration of several experimental watersheds.

Snowfields and Summer Streamflow

Deep snowfields at high elevations are a valuable source of water in streams during the summer months. Snow-fence barriers used in experiments in Utah have nearly doubled the depth of snow accumulation as compared with surrounding snowfields. Studies on size, shape, and location of barriers to increase their effectiveness are continuing. Another experiment in Colorado showed that condensation in high-altitude snowfields increased their water content in streams by 1,300 gallons per acre per day during a 10-day period in August. These studies indicate two things: (1) that summer streamflow may be significantly extended by causing more drifting of snow at high altitudes, and (2) that evaporation losses from drifted snow are considerably less than previously thought.

RANGE AND WILDLIFE HABITAT

More Forage per Acre

Grass production may be increased from 675 to 2,415 pounds per acre by eradicating undesirable hardwoods, according to studies in Louisiana. This treatment also increased crude protein and phosphorous content of the forage, and these nutrients stayed above the minimum cattle requirements much later in the season than on untreated areas. Similarly, controlling low-grade hardwoods with herbicides in the Missouri Ozarks stepped up forage production of grasses and legumes more than five times from 219 to 1,213 pounds per acre.

Converting Brush to Grass

As a result of experiments in California, scientists are now able to describe conditions and procedures necessary for successful eradication of woodland brush and establishment of a grass cover. These studies revealed that conversion of the relatively worthless brush growth has provided 130 percent more animal-days of grazing per acre, a 47-percent longer grazing season, and a 55-percent increase in weight gain per animal. Other benefits of this treatment included improvement of wildlife habitat and reduction of fire hazard.

The following prescription will now provide the range technician with a workable procedure for converting both chemical and woodland brush to grass: (1) select a site with gentle slopes and good soil, (2) crush brush with a bulldozer and remove by safe burning using area ignition, (3) drill suitable forage species, (4) spray with 2,4-D to kill brush seedlings and sprouts, and (5) graze conservatively to promote vigorous forage growth.

Heavy Grazing vs. Plant Growth

It has long been known that persistent heavy grazing reduces range forage values. Results of studies in Colorado now give some figures on extent of damage to pine-bunchgrass range. Here grasses and sedges maintained or increased their yield during the past 16 years under light and moderate grazing, whereas yield on heavily grazed range was reduced by more than half. Production at the beginning (1942) and in 1957 was as follows:

	Herbage (pounds per acre)	
Grazing intensity:	*1942*	*1957*
Light (10 to 20 percent removal)	317	335
Moderate (30 to 40 percent removal)	361	446
Heavy (more than 50 percent)	351	148

In 1957 the valuable grasses, Arizona fescue and mountain muhly, averaged 11.8 and 7.4 flower stalks per plant under light and moderate grazing, respectively, but only 2.3 flower stalks per plant under heavy grazing.

Insect and Rodent Damage to Range

In some areas insects may cause more damage to vegetation than livestock and big game combined. Exploratory studies in Oregon—collecting insects from bitterbrush and associated plants—established the identity of 80 species representing 45 different families. Tent caterpillars, which cause severe damage to bitterbrush, were found to be parasitized by other insects, indicating that biological control of this pest may be possible.

A way may have been found to diminish the damage by gophers, a troublesome range pest, by reducing forbs, the gopher's preferred food. In Colorado experiments the gopher population declined 87 percent on grass-forb range as a result of altering the vegetation by spraying with 2,4-D. The spraying not only brought a 70-percent reduction in forbs but also caused a 37-percent increase in grass, and hence an increase in the livestock grazing capacity.

Big Game Habitat Improved

Artificial revegetation continues to show promise of improving the habitat of deer and other big game. On winter deer range in Utah experimental plantings were made with 475 shrubs and forbs representing 85 species. Antelope bitterbrush and fourwing saltbush appeared to be best for this purpose. However, cliffrose, big sagebrush, rubber rabbitbrush, and curlleaf mountainmahogany also showed considerable promise. In both Utah and Idaho, experiments showed that endrin combined with fungicides was more than 95 percent effective in protecting planted bitterbrush seed from mice. Techniques developed by research in California were used with good results on an 18-acre pilot area of deteriorated winter deer range. More than 12,000 bitterbrush seedlings per acre were established.

ANALYZING FOREST FIRES

As a growing population demands more products and services from forest, range, and watershed, it becomes increasingly urgent to fully protect these valuable natural resources from wildfire. While progress is being made—through the use of smokejumpers, aircraft, fire-retarding chemicals, other improved equipment and techniques—the ultimate answer to this problem has not been found. It is the job of forest fire research to look below the surface, and search for new ways to better control or completely conquer this menace to woodland wealth.

New Facilities for Basic Research

There is adequate know-how to control the average forest fire. However, by far the greatest damage results from a relatively few big fires, those that "blow up" and otherwise get out of control. Such fires, often acting in unexpected and unexplainable ways, successfully defy all that man has learned about fighting them. These are the fires that destroy extensive timbered areas, create catastrophic erosion and flood problems, and sometimes take human lives. Scientists studying the forest fire problem have long recognized the need for more fundamental knowledge about the physics of fire, how and why it acts in certain ways. To meet this need, two forest fire laboratories for basic research will soon be in operation.

The first of these laboratories at Macon, Ga., nearing completion at the end of 1958, was built by the State in cooperation with the Forest Service. It will provide facilities for the kind of studies needed to solve many urgent fire problems of the East and South. The second such laboratory is being constructed by the Forest Service at Missoula, Mont. Scheduled for completion in 1959, it will likewise permit undertaking new kinds of basic fire research needed in the North and West. Research workers regard these two laboratories as milestones in man's struggle to control wildfires. Through them, scientists will concentrate efforts to take some more of the mystery out of the most destructive and unpredictable fires.

Additional Support

The Committee on Fire Research and the Fire Research Conference, National Academy of Sciences-National Research Council, played a big part in recognizing the need for more basic research in free-burning fires and their response to various environments. They developed a framework of basic fire study needs of interest to all fire agencies and brought together noted scientists to better coordinate efforts.

Dr. James R. Killian, science adviser to the President, became interested in the work of the committee, and on December 9 he arranged a meeting of heads of interested agencies to look for ways to speed up work in this field. In addition, the National Science Foundation became active in furthering basic forest fire research.

Drought Indicator

A system was devised to indicate the buildup of serious fire situations associated with periodic droughts in the South. This system, forewarning of the approach and existence of such conditions, will enable fire protection organizations to adjust their activities to meet these infrequent emergencies. The system computes a daily balance between precipitation and an index of evaporation and other water losses determined from daily mean temperature. When this balance is plotted on a chart, the current soil moisture and trends which influence fire danger are readily apparent.

COMBATING FOREST DISEASES

Tree diseases cause greater losses in wood volume and growth than any other forest enemy. Though they take their toll over a longer period, forest diseases are far from static. New ones show up periodically, others decline, and changing conditions alter their significance. For example, a blight of sugar maple appeared just last year, while accumulated evidence indicates that sweetgum blight may be on the decline; and cone rust of southern pines has become an important disease due to increased demand for tree seed to meet expanding planting needs.

Maple Blight

A new disease of sugar maple was first observed in Wisconsin in 1957. In 1 year the blight killed all trees of this valuable species, from saplings to mature veterans, on about 1,000 acres scattered throughout a 10,000-acre forested tract. By the end of 1958, 1½ million board feet of blight-killed maple had been salvaged from the affected stand. The Forest Service, the State of Wisconsin, and

industry have pooled resources to determine the distribution and cause of this disease and to formulate remedial measures.

Sweetgum Blight

A general decline of sweetgum has been apparent throughout its range during the past two decades. As recently as 1954 a South-wide survey showed about 40 percent of the total volume of merchantable sweetgum was affected to some extent, with about 1 percent dead. However, since that time, sweetgum appears to be improving, at least in some parts of the country.

Studies recently completed in Mississippi show a positive correlation between the severity of sweetgum blight and soil factors that limit soil moisture. This strongly suggests that the disease is essentially a drought response. The recent apparent improvement is attributed to the break in prolonged drought conditions in the deep South. Data are insufficient to prove that all sweetgum blight is drought induced, but no specific pathogen has been found as a causal factor.

Southern Cone Rust

Cone rust is a major cause of fluctuations in slash and longleaf pine seed crops in the Southeastern and Gulf States. In some years as high as 90 percent of the slash pine seed crop is lost. Recent expansion of slash pine planting depends on large, regular supplies of seed, particularly from high-quality stands selected as seed production areas. Thus, control of this disease is essential if expanded planting is to continue.

Results of experimental fungicidal sprays on pines show great promise for direct control of cone rust. Research is continuing to find more effective chemicals and determine time, frequency, and method of application. Studies are also under way to determine the maximum distance that cone-infecting spores of the fungus can travel from the alternate oak hosts. This may offer yet another approach to control.

INSECTS—A PERPETUAL THREAT

There is no armistice in the battle with forest insects. They kill outright about twice as much sawtimber annually as diseases, and seven times as much as fire. Therefore, if growing demands on the forests are to be met, more study should be concentrated on reducing this waste. Some significant advances in learning how to control forest insects were achieved in the past year.

Great Basin Tent Caterpillar

Populations of the Great Basin tent caterpillar, a serious pest in aspen stands of the Southwest, can be reduced by virus sprays applied from aircraft. This was learned through cooperative research by Forest Service and Agricultural Research Service entomologists. The spray was applied to infestations already harboring the virus at a very low level of intensity. After the spray was applied, from 20 to 40 percent of the caterpillars were killed by the virus, while caterpillar mortality in untreated areas averaged only 5 percent.

Bark Beetle Control

Jeffrey and ponderosa pine losses from bark beetles in recreation areas of southern California can be reduced by removing trees considered most likely to be attacked. This was disclosed in recent studies on a 5,500-acre test area in the San Bernardino National Forest. During the 2 years before removing susceptible trees, losses had averaged 200 board feet per acre. In the first, second, and third years after the removal, losses were only 12, 15, and 28 board feet per acre, respectively.

In Arizona and New Mexico, recent studies indicate that ponderosa pines highly susceptible to attack by bark beetles can be recognized before they are attacked. This suggests that a system or risk rating for these insects might be developed similar to one being used with outstanding success in California and Oregon.

Elm Spanworm Epidemic

During the past few years the elm spanworm has become epidemic in hardwood stands in Georgia, Tennessee, and North Carolina, stripping the leaves from more than a half million acres of forest. Experimentally, 99 percent control has been achieved by aerial spraying with a mixture of 1 pound of DDT to 1 gallon of kerosene per acre.

Black-Headed Budworm

In 1957 about 250,000 acres of forest in the Washington Cascades were threatened by an outbreak of the black-headed budworm. However, this is a case where natural control has diminished the threat. A biological evaluation study was made to find whether direct control was needed. Comparison of numbers of new and old eggs showed a sharp reduction in the size of the 1958 brood; hence direct control was not initiated. In the spring about 30 percent of the eggs proved sterile. Subsequently, larval populations were drastically reduced by insect parasites and disease, with the parasites being twice as effective as disease.

AIDING FOREIGN FORESTRY

Forest Service activities in servicing the U.S. International Cooperation Administration were centered in a new Office of Foreign Forestry Services under the direction of the Assistant Chief for Research. The services involved both the technical support of ICA foresters assigned abroad on technical assistance and the training of foreign nationals in the United States and Puerto Rico under ICA sponsorship. In addition to serving as

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a focal point for channeling services to ICA, this office served as a point of contact with the North American Regional Office of the Food and Agriculture Organization in recruiting American foresters for the organization's programs, in training FAO fellows in the United States, and in other cooperative activities.

These services showed substantial increases during the year. Under the heading of technical consultation and support, commonly known as backstopping, 130 ICA requests from 35 countries for technical information were handled during the year. Further assistance was given in recruiting, providing reimbursable details of Forest Service personnel to ICA missions, the orientation and briefing of forestry technicians being sent abroad, and in procuring specialized forestry equipment for use overseas. During fiscal year 1958, 197 foreign nationals from 36 countries arrived in the United States and Puerto Rico for training by and in the Forest Service, in methods of forest, range, watershed, and multiple-use wild-land management, and in forest products utilization.

National Forests Under Multiple Use

Under the twin conservation goals—multiple use and sustained yield—the national forests experienced general progress for the year. The trend, apparent for several years, toward greater demand for and use of all the main resources—outdoor recreation, wildlife, water, timber, and range—was the single most significant fact in the management of these public lands.

This was the year Forest Service gross cash receipts passed the billionth-dollar point. On November 21, Secretary of Agriculture Ezra Taft Benson presented Treasury Secretary Robert B. Anderson a check for $4,651,345, symbolizing passage of the billionth dollar into the U.S. Treasury. The sale of timber had accounted for 86 percent of receipts, and the remaining 14 percent came from grazing permits and other land uses.

Recreation visits were up 12 percent over those of 1957, including an increase of nearly 2 million hunting and fishing visits. In response to this rapidly growing use, more administrative attention was being directed to outdoor recreation and to related wildlife habitat management. Rehabilitating damaged areas of national-forest watersheds was moving forward, reducing flood danger and improving both quality and quantity of usable water. It was another outstanding year for fire control—21,000 fewer acres burned than in 1957, the previous low-record year.

Volume of timber harvested from national forests held up near the record 1957 cut, despite a lumber market still emerging from a slight depression. Progress was made in building access roads and in speeding up mapping, surveying, and posting boundaries; this work was materially advanced by successfully adapting aerial photography to land surveying. Grazing receipts were up some $300,000 over 1957, and effective work was accomplished in range improvements.

A fast-growing population, more people turning to the outdoors for relaxation, the lumber industry needing more national-forest timber, and the expanding use of water—all these were bringing pressures and problems of a magnitude never before felt. The job of achieving harmonious use of the several resources, for the greatest public benefits, was becoming more complex. One thing was evident: all functions of national-forest management will have to be greatly intensified if these lands are to contribute their full potential to the economy of the country and the happiness of its people.

RECREATION—MAJOR LAND USE

The call of the outdoors—woods, fields, streams, and mountains—continued in 1958 to lure more millions of people to national forests, further emphasizing a significant national trend. A steadily rising volume of visits to national forests in the last 14 years, closely paralleled by such use of other public and some private lands, strongly indicates that outdoor recreation is rapidly becoming a major land use.

There were 68.4 million recreation visits to national forests in 1958—a 12-percent jump above the previous year's figure. Total visits amounted to 86,365,000 man-days' use. Wholesome outdoor activities like hunting, fishing, camping, riding, skiing, picnicking, swimming, and just quiet enjoyment of nature's scenic wonders, are increasing at a phenomenal rate. They are outgrowing most of the facilities that have been built. This use of national forests has more than doubled within the past 8 years since 1950, and skyrocketed to almost four times the annual use in 1946.

This remarkable growth can be demonstrated by a comparison of figures showing the purpose of national forest visits:

Primary purpose:	1958	1957	1956	1950
General enjoyment of the forest environment	18, 247, 000	16, 634, 000	14, 190, 000	7, 969, 000
Picnicking	16, 127, 000	14, 742, 000	12, 821, 000	6, 326, 000
Fishing	12, 245, 000	11, 000, 000	9, 499, 000	4, 885, 000
Hunting	5, 589, 000	5, 168, 000	4, 436, 000	2, 285, 000
Camping	4, 934, 000	4, 289, 000	3, 516, 000	1, 534, 000
Winter sports	4, 022, 000	2, 760, 000	2, 673, 000	1, 517, 000
Swimming	2, 028, 000	1, 809, 000	1, 610, 000	902, 000
Hiking and riding	1, 613, 000	1, 457, 000	1, 353, 000	635, 000
Organization camping, canoeing, scientific study, hobbies, wilderness, etc	3, 645, 000	3, 098, 000	2, 458, 000	1, 315, 000
Total	68, 450, 000	60, 957, 000	52, 556, 000	27, 368, 000

Operation Outdoors

The second year of Operation Outdoors, Part 1, began July 1, 1958. The goal of this 5-year program is to provide sanitation, cleanup, and care at existing recreation areas, and provide new areas and facilities to relieve overcrowding and take care of expected increases by 1962.

Significant progress has been made, but the demand for more facilities has been growing much faster than anticipated. In 1955 it was estimated that by 1962 there would be 66 million annual visits. But the 1958 total topped that figure by more than 2 million. A conservative revised forecast now indicates that recreation use will be 92 million visits by 1962, or 36 percent higher than the original estimate. All of which made it clear that if Operation Outdoors goals were to be met, the program would have to be stepped up materially or the period extended.

During the first year and a half of Operation Outdoors, all developed areas and facilities have been adequately serviced and maintained. The full 5-year program called for rehabilitating 40,175 family camp and picnic units, of which 5,964, or 15 percent, had been completed. Of 40,500 new family camp and picnic units originally programed for construction, 4,293, or 10.6 percent, were complete. Eleven of the 120 winter sports sites needing rehabilitation have been completed, and of 68 to be expanded or built, 19 were finished. One hundred and seventy swimming sites were scheduled to be rehabilitated, and 50 of these were completed. Out of 239 swimming sites to be expanded or constructed, 19 had been finished.

Overuse of campgrounds and picnic sites continues to increase at an alarming rate. Overuse amounted to 68 percent in 1957, and it is expected to increase to 101 percent in 1961. Campgrounds and picnic sites are not being developed fast enough to take care of the camping and picnicking use.

Recreation Survey

While greatly increased recreation visits and overcrowded facilities were a matter of record, there remained many unknown factors in this relatively new trend. Consequently, plans were made for a complete, detailed study of outdoor recreation resources and potentials on lands managed by the Forest Service. Fieldwork on this study began in early 1959. Information thus gained will be needed by the Forest Service in meeting this resource demand. In addition, such information may be needed by the National Outdoor Recreation Resources Review Commission, established by Congress in 1958 to make a national inventory of outdoor recreation resources.

In connection with the Forest Service recreation survey, a projection of future use was made, indicating that by 1976 some 230 million visits probably will be made to national-forest lands, and by the year 2000, a probable 600 million visits.

Special Uses

More than 56,000 special-use permits were in effect, involving over 3 million acres of national-forest land. These permits to individuals, companies, and agencies are for more than 100 different kinds of uses, including aircraft landing fields, cabins, churches, resorts, schools, and winter sports areas.

Public or semiprivate uses are free. For commercial-type permits or those authorizing private uses, a fee commensurate with value is charged. Receipts from special-use permits came to $1,211,378 in fiscal 1958, compared with $1,189,641 in 1957.

In addition, more than 2,800 mineral, oil, and gas leases were in effect on some 1,800,000 acres of national-forest land. Receipts from these were $1,045,901 compared with $843,813 for fiscal 1957.

Besides their commercial value, special-use facilities help the public enjoy these forest lands. The more than 500 resorts, 128 winter sports areas, and nearly 19,000 summer homes aid and supplement free public use and form an important part of national-forest recreation.

Mining Surface Rights

Determining surface rights on mining claims under the Multiple-Use Mining Act was ahead of schedule. At the end of 1958, field examinations had been completed on 372 areas, totaling 42,697,777 acres. This was approximately 47 percent of the work to be done.

Forest Service mineral examiners have handled 5,343 claims of the 8,616 included on verified state-

ments. Validity of asserted surface rights has been recognized by the Forest Service on 810 claims. Verified statements were withdrawn by claimants on 2,183 claims, and action is pending on the remaining 2,350 claims handled.

More Wilderness

Another area for wilderness fans, the Jarbidge Wild Area in northern Elko County, Nev., was established in 1958. It includes a land area of 64,827 acres with eight mountain peaks of more than 10,000-feet elevation. Highest one in the Jarbidge Range is the 10,839-foot Matterhorn, which resembles its Swiss counterpart. This brings the Forest Service total to 82 areas and 14 million acres of land available for wilderness-type recreation.

Discovered—Oldest Living Things

A time-weathered tree in the Inyo National Forest (California) was proved to be the oldest known living thing on earth—4,600 years old. The discovery and dating of a grove of bristlecone pines, including 17 older than 4,000 years, was the work of Dr. Edmund Schulman, University of Arizona wood scientist. They predate the famed California sequoias by some 11 centuries. To preserve these patriarchs of the plant world for scenic, scientific, and historical purposes, the area was set aside as the "Ancient Bristlecone Pine Forest" and given special protective attention as a natural area.

PUBLIC HUNTING AND FISHING

Following the general trend in other outdoor pursuits, the Nation's hunters and fishermen are turning to national forests in greater numbers every year. Sportsmen made more than 17½ million visits during the year, accounting for slightly more than one-fourth of the total recreation use. It was 10 percent more than in 1957. Thus wildlife habitat management is becoming a bigger job.

Annual hunting and fishing use has gone up 259 percent since 1947—six times faster than the increase in total sale of hunting and fishing licenses in the United States for the same period. This means that millions of sportsmen who formerly sought game on other lands are now using national forests. Some of the reasons for this are faster transportation, more private land taken up with the growth of cities, highway and industrial developments, the posting of more private lands, and other changing patterns of land use.

The increasing lure of these lands may be understood when one realizes that about a third of the country's big-game animals and untold millions of small game and birds live on national forests. Here sportsmen have 181 million acres to hunt, 2½ million acres of lakes and 81,000 miles of streams to fish—all unhampered by "no trespassing" signs.

The growing importance of national forests as public hunting and fishing grounds is shown in the table below.

	1947	*1958*	*Percent increase*
Nationwide license sales:			
Hunting	12, 067, 000	14, 764, 000	22
Fishing	12, 620, 000	20, 178, 000	60
Total	24, 687, 000	34, 942, 000	42
Sportsman visits to national forests:			
Hunters	1, 498, 000	5, 595, 000	273
Fishermen	3, 446, 000	12, 147, 000	252
Total	4, 944, 000	17, 742, 000	259

To handle the growing wildlife habitat management job, 8 of the 10 Regions added at least one full-time wildlife specialist to their staffs during the year. All Regions have assigned full- or part-time wildlife staff specialists to forests or groups of forests with heavy wildlife workloads. Consequently, technical direction of this work on all national forests has increased. This is resulting in (1) improved integration of wildlife habitat management with other resource management activities, (2) accelerated progress in coordinating big-game range analysis with livestock allotment analysis, (3) additional training of all personnel in wildlife habitat needs and techniques, and (4) more Forest Service supervision and participation in State wildlife management activities on national-forest lands.

All western regions continued formal on-the-ground training schools for rangers and staff specialists on game range analysis procedures. The Southern Region conducted formal training sessions on timber management-wildlife coordination measures for unit managers and staff specialists. All Regions intensified their training of forest wildlife staff specialists who have, in turn, conducted on-the-job training for other forest personnel.

Cooperation With States

A strong cooperative program with fish and game departments is basic to wildlife management on national forests. The Forest Service is responsible by law for managing the land. State fish and game departments are likewise charged by law with the protection and management of wildlife populations. Thus, effective wildlife management involving national forest lands requires joint action between the Forest Service and the States.

The Forest Service continued to encourage State and other organizations to engage in direct habitat work on national forests. Data on the extent of the States' participation in improvement projects on all national forests is not yet available. As an example, however, in fiscal year 1958, Kentucky, Virginia, West Virginia, and Pennsylvania spent a total of $434,000 on direct wildlife projects on the five national forests in these States.

Service-wide accomplishments in cooperative habitat development include several new fishing lakes, stream improvement structures, streambank stabilization, wildlife openings, food and cover plantings, water developments, browse regeneration, and many miles of access roads and trails.

WATER FROM NATIONAL FORESTS

Because water is essential to every form of life and to every activity of civilized man, it is perhaps the most valuable resource that comes from national forests. Preserving valuable watersheds has been of paramount interest to the Service since the national-forest system was established in 1905. In view of a steadily increasing demand for water, all possible effort is being concentrated through research and management toward protecting, improving, and increasing water flow from these high water-yielding lands.

Watershed Improvements

Rehabilitating damaged areas is progressing in all parts of the country, but much of this work still needs to be done. National-forest lands include extensive areas subjected to erosion, which causes continuing site deterioration or permits native plants to stabilize the soil only very slowly. In this category there are 3½ million acres of eroding slopes, some 43,000 acres of slides and unstable dunes, 6,200 miles of stream channels, and more than 20,000 miles of gullies. Intensive treatment of the land is needed to check erosion and surface runoff, improve infiltration capacity of the soils, and restore the land to usefulness. Many sites that are flood sources can be treated so as to reduce the flood potential sharply.

An example of this kind of work carried on during the year is the Provo Peak project, one of 25 in the Intermountain Region of the West. It includes about 11 miles of the crest of the steep Wasatch Mountains near Provo, Utah. Four west-sloping drainages within the project terminate in highly developed industrial, residential, and agricultural areas in eastern Provo and Springville. Past excessive grazing in the high basins reduced plant cover and disturbed the soil so that heavy summer rainstorms periodically produce damaging floods. Corrective treatment includes contour trenching to prevent surface runoff, gully plugging to impede water movement in gullies, erosion control on roads and trails, and seeding to establish protective plant cover. Utah County, Provo, and Springville are cooperating in the project by maintaining and improving protective structures at the base of the mountain slopes.

Much improvement in the watershed was noted by examining a recently completed 3-year project on the San Isabel National Forest in Colorado. Surface runoff has been slowed to a point where it no longer carries silt. Meadow-type vegetation is returning to bottom lands where the water table has been restored by gully stabilization and contour trenches. Castlerock Creek, which once peaked after each rain and then dried up, is now a year-long live stream supporting fishlife.

Work is underway to restabilize shifting coastal dunes within the Siuslaw National Forest near Florence, Oreg. Benefits expected include protection of roads, campgrounds, small lakes, and streams from encroaching dunes, and better habitat for wildlife. Soil-stabilizing vegetation has been planted on several hundred acres.

Typical of improvements in the East was the rehabilitation work done on four municipal watersheds on the White Mountain National Forest in New Hampshire; they have been stabilized and should steadily improve the quality and yield of domestic water supply.

Logging a Municipal Watershed

Technical assistance was provided the city of Bradford, Pa., in planning and starting a program of timber harvesting in the city-owned municipal watershed. Under authority of the Granger-Thye Act, the Forest Service supervised layout of logging roads and timber cutting on a reimbursement basis. Particular care had to be taken to avoid damaging the city water supply. An income of $40,000 was realized, and the operation was so successful that the city is considering a series of harvest cuts that will eventually cover the entire watershed.

Cooperation—Soil Conservation Districts

Managers of national forests have cooperated in watershed work with members of soil conservation districts for many years. In effect now are 102 written agreements and 528 informal working arrangements with 630 soil conservation districts whose boundaries include portions of national forests or land utilization projects.

NATIONAL-FOREST FIRE CONTROL

Despite a more severe season, it was another highly successful year in keeping wildfires from destroying valuable forest resources. The low record in acreage burned which was established in 1957 was reduced still further in 1958—only 116,453 acres burned compared to 141,191 the previous year. The previous 5-year average was 244,125 acres annually. Averaged over the 191 million acres protected by the Forest Service, the 1958 record was equivalent to forest fires burning only 1 out of every 1,709 acres.

The success of the 1958 season may be measured in another way. There were more fires—11,085 compared with 7,217 in 1957, and a 5-year average of 10,058. Since more fires started but less acreage burned, it is obvious that more fires were controlled or put out while still small.

A factor in the larger number of fires was that lightning caused the third largest number in the past 25 years—a 32-percent increase above the past 5-year average. The more encouraging factor was that even with more fires, man-caused fires were still on the decrease.

In recent years there has been much success in reducing forest fire damage. This has been due to good prevention work, including the Smokey Bear and Keep Green programs, to the hard work of many firefighters, and to improved equipment and techniques. As a result most fires are caught while still small and put out. But there remains the threat of the big fire that may get out of control to destroy vast areas of the forest and sometimes take the lives of firefighters. It is this problem—the few big fires defying control—that receives continued emphasis by fire control men and to which research attention is directed.

Aerial Firefighting

Stepped-up use of smokejumpers, airplanes, and helicopters, and aerial application of chemicals helped materially in reducing areas burned during the past 2 years. Sodium calcium borate mixed with water has been the most widely used fire retardant, but experiments with other materials, including bentonite, show much promise.

Air tankers applied more than 1,500,000 gallons of fire-retardant mixture on 322 fires in 1958, compared with 640,000 gallons on 100 fires the previous year. Helicopters were flown 4,106 hours, transported 11,889 people, and 366,687 pounds of cargo. In hours flown, this was an increase of 64 percent over 1957. Smokejumpers—parachuting firemen—were used more than in any year since this method of attack was started. A total of 2,251 jumps were made to 714 fires. This was almost double the 1957 record of 1,497 jumps to 319 fires.

Aircraft, including helicopters, were flown 27,029 hours in fire control work and carried 26,300 passengers. Most of the aerial work was done in commercial or private aircraft under contract.

Safety and Training

An accelerated program for safe firefighting moved ahead rapidly. A Service-wide training session in fire behavior was conducted at Missoula, Mont., in March, with 30 trainees. A second session was planned at Alexandria, La., for February 1959.

In cooperation with the Army Engineers, aluminized suits for firefighters were being tested. Other equipment being developed and tested included ponchos, blankets of heat-reflecting and resistant materials, and breathing devices. Cooperation and coordination with the Army Quartermaster Research and Development Command was continued.

High Price in Lives Lost

An otherwise successful fire season was marred by the death of 13 persons. In California three men burned to death on three separate fires. One man lost his life when struck by lightning. Five men, all pilots, were killed in airplane crashes during aerial tanker operations. While engaged on a cargo-dropping mission in the State of Washington, four were killed in an airplane crash. In addition, State foresters reported 19 fatalities in firefighting.

TIMBER FOR AMERICA

Demand for national-forest timber has risen steadily in recent years. Harvesting of this publicly owned timber is an economic force in many areas, meaning jobs and payrolls for thousands. For these reasons, the Forest Service objective is to sell and have harvested the full allowable cut wherever practical under the guiding principles of sustained-yield and multiple-use management. Through improved inventory and management plans and more access roads, progress was being made toward this objective.

Timber Cut and Sold

Total volume of timber cut from national forests in fiscal 1958 was 6.4 billion board feet, about 8 percent below the 1957 figure. These lands supply about one-fifth of the total volume of timber harvested in the Nation.

Average value of national-forest timber cut in 1958 was $14.67 per thousand board feet—$1.90 below the average for the previous year. This indicates the effect of general business conditions on the national-forest timber business for the year ending June 30, 1958.

New Record in Sales

During fiscal 1958, 13.3 billion board feet were sold, including 5.3 billion feet in a 50-year Alaska pulptimber sale. Excluding the Alaska sale, the volume sold—8 billion board feet—set a new record for sales in 1 year. The average value of $12.94 per thousand board feet bid for this 8 billion feet represents reduced appraisals geared to current market conditions, and somewhat more restrained competitive bidding than was evident in the previous period of higher market values.

Inventories and Management Plans

By the end of the year more than half of the 400-odd national-forest working circles had been covered by an up-to-date inventory. As a working circle inventory or reinventory is completed, allowable cut is calculated under sustained yield, and a timber management plan is prepared. This is a long-term plan designed to guide and regulate cutting according to the producing capacity of

the commercial forest land within the working circle. The management plan also is guided by the multiple-use policy, which aims at correlating continuous crops of timber with other uses of the national forests, such as water production, recreation and wildlife, and others.

Annual Allowable Cut

The annual allowable cut for national-forest working circles is commonly expressed in two parts: (1) the cut of sawtimber-size material, and (2) the cut of other material (large cordwood) from smaller timber. On many national-forest working circles, the present actual cut of sawtimber is at or near sustained yield as now established. However, few working circles are contributing their full share of smaller products, such as pulpwood. On other working circles the market is not there to demand the top allowable cut as now established.

As market demands increase and utilization and other practices change, timber management will gradually intensify. Allowable cut under sustained yield will be established at higher and higher levels, in step with changing practices.

In 1958 the allowable annual cut was calculated at 10.2 billion board feet, of which 8.9 billion was sawtimber and 1.3 billion feet was smaller material.

A Look to the Future

By the year 2000, it is predicted that national forests should yield annually some 21.1 billion board feet of sawtimber and 6.2 billion feet of smaller stock, for a total of 27.3 billion board feet.

Timber Stand Improvement

Planting or seeding is necessary to put back into production areas deforested by fire or other causes, and in some cases to reestablish a stand after harvesting. Not much progress has been made in reforesting 4.4 million acres of nonstocked and poorly stocked lands on national forests that have resulted from fires and other causes.

Much more progress is being made in reforesting timber sale areas where prompt natural regeneration cannot be depended on. Detailed accomplishments in all phases of reforestation and timber stand improvement during fiscal 1958 were as follows:

	Acres
Planted and seeded	88,985
Natural regeneration measures	60,827
Plantation release	42,402
Weeding, thinning, cull tree treatment, natural stands	484,911
Pruning and crop tree release	148,339
Animal control (mostly fencing)	217,299
Rodent control (including porcupine)	252,496
Sanitation cutting	78,655

Forest planting stock produced and distributed at the 12 Forest Service nurseries totaled 111 million trees. Of these, 43 million seedlings were planted on national forests, and 68 million were distributed to States or to other Federal agencies.

Timber Access Roads

One of the essentials in the proper management, protection, production, and harvest of national-forest timber is a permanent road system in the forest. In 1958 the Forest Service constructed 52 new bridges and built or rebuilt 441 miles of timber access roads. Timber purchasers built or rebuilt during the year an additional 3,097 miles of roads, bringing the total timber access roads constructed in 1958 to 3,538 miles.

Many timber sales contracts require purchasers to construct access roads necessary to their operations. Estimated cost of such roads is one of the items used in appraising the value of the timber; thus the roads are built at public expense.

THE GRAZING RESOURCE

Administering the grazing resource is a major part of national-forest management in the West. It includes handling grazing permits, range management planning, building and maintaining range fences and water facilities, and improving ranges by seeding, controlling undesirable plants, water spreading, and other measures. This resource, harmonized with other resources, involves domestic livestock grazing on some 62 million acres of national-forest lands a part of each year—bringing in 1958 nearly $4 million of income. The same lands also produce some timber, serve as watersheds, and sustain large numbers of big-game animals.

In fiscal 1958 owners grazed 3,723,161 head of livestock (cattle, horses, sheep, and swine) under 17,995 paid permits. Grazing receipts from national-forest lands came to $3,013,930. This was an increase of $331,581 above 1957 receipts.

On land utilization project lands, additional grazing permits were issued to 4,842 livestock owners, involving 237,752 cattle, horses, and swine, and 89,295 sheep. These brought grazing receipts of $697,315.

Total grazing receipts in 1958, from national-forest lands plus land utilization project lands, came to $3,711,245.

Range Improvements

About 113,520 acres of rangelands were rehabilitated by seeding and controlling undesirable plants. Advances were made in developing equipment for removing competing vegetation and preparing sites for seeding. During the year, development of the front-mounted brush cutter was completed, and both ground and aerial spray equipment were improved. Some 448 miles of fence and 401 water developments were built by the Forest Service.

Outstanding records were made by several regions in various range improvements, with per-

mit-holding ranchers financing about one-third of the cost. In Region 3 (Southwest) juniper and piñon were eradicated on 60,714 acres. Region 5 (California) treated 10,265 acres to increase livestock and game forage, and seeded 57,000 acres of wildfire burns. Permittee cooperation aided measurably in the overall accomplishment. In Region 6 (Pacific Northwest) noxious farm weeds were controlled on 1,000 acres, and 10,785 acres of logging-disturbed areas and roadsides were seeded for erosion control.

Grasshoppers and Mormon crickets were controlled on 314,557 acres of infested rangelands, in cooperation with the Agricultural Research Service under the Federal-State grasshopper control program. Surveys in 1958 indicated that some 689,000 acres of Forest Service land in eight Western States were infested with grasshoppers and Mormon crickets.

Range improvements by those holding grazing permits are on the increase: for the year permittee cooperation amounted to $612,536—about 18 percent more than was received in 1957.

Training

Greater emphasis was placed on range management work on all national forests. Regions appointed 43 individuals with range management training to forests and districts with heavy range workloads. All western regions held formal on-the-ground training schools for range and wildlife unit managers and technicians. The schools covered livestock-big game range analysis procedures, management planning, horsemanship, and safety in aerial and ground equipment operations.

Service-wide instructions for livestock-game range analysis were prepared; work continued on analyzing conditions and trends of range allotments and preparing management plans in cooperation with permittees.

ENGINEERING—NATIONAL FORESTS

Nearly all engineering skills are required in managing, protecting, and using the resources of the national forests. To manage and harvest timber and permit people to get in and through the forest for recreation and other purposes, roads and trails and bridges are essential. These must be surveyed, designed, and built by engineers, often in rugged mountain country where superior skills are called for. Land and boundaries must be surveyed, mapped, marked, and posted. Engineers design and construct airfields, ranger stations, family housing, lookout towers, water systems, recreation areas, and special-purpose dams. There are radio and telephone systems and heavy equipment to be installed and maintained. And engineers do research in equipment development, wood use, photogrammetry, and forest fire control.

Land Surveying

The Forest Service has succeeded in adapting photogrammetry (surveying and mapping from photographs) to cadastral or land surveying. Briefly, the process employs aerial photography to replace the transit and chain. It was developed by the Forest Service and detailed tests were made to establish its accuracy and legality. In October 1958 the Bureau of Land Management (the legally responsible agency) reestablished a final land corner from the Forest Service's Tahoe test project. This completed the first official retracement of a township survey by photogrammetric procedures in the United States.

Roads and Trails

During the year 3,936 miles of additional roads, 180 miles of trails, and 437 bridges were built or improved. Of this work, 3,538 miles of roads and 52 bridges were of primary use in harvesting timber. The Forest Service does the engineering for roads built by timber purchasers.

Cartography (Mapping)

Maps are necessary in translating management plans into action on the ground. The total area of national-forest interest (including adjacent lands) that needs mapping is 724,865 square miles. Prior to 1958 the Forest Service had constructed or compiled planimetric maps for 396,000 square miles of this. An additional 70,594 square miles were mapped in 1958—by the Forest Service and other agencies—for a total of 466,594 square miles.

Topographic maps (detailing surface features) have been made for 174,000 square miles. The Forest Service depends primarily on the U.S. Geological Survey for topographic mapping.

There remains a backlog of map data and the urgent need for maps, but new mechanical and electronic equipment is helping to cut down the backlog and bring the map supply nearer demand.

Waterpower Developments

Water resources of national forests continue to contribute to private and municipal hydroelectric power developments, as licensed by the Federal Power Commission. For the year, 3 new projects were licensed, bringing the total to 140 projects. These developments have an installed generating capacity of more than 4,680,000 kilowatts—2½ times the installed capacity at Grand Coulee Dam. Typical of the impacts of six proposed projects reported on in 1958 is that of the Muddy project on the Lewis River in Washington. Its reservoir will flood some 3,100 acres of national-forest land, which supports a stand of 240 million board feet of merchantable timber.

The Forest Service study of this proposed project involved planning for the orderly removal of the timber within the construction period, and laying out an alternate road system to serve up-

stream lands and resources. The impact study must also determine facilities needed to accommodate the thousands of additional recreation visitors annually. Reports of Forest Service studies on such areas are made to the Federal Power Commission with recommendations as to license conditions necessary to protect and utilize national-forest lands and resources.

Lands

National-forest and related lands amounted to about 181 million acres at the end of fiscal 1958. Related lands include 137,678 acres of forest and range experimental areas. In addition, at the end of 1958 the Forest Service administered Land Utilization Projects totaling about 4.6 million acres.

NATIONAL-FOREST LANDS

About one-fifth of the land within national-forest boundaries is owned by States, counties, other Government agencies, and private individuals. This mixed pattern of ownership complicates management of the national forests. A continuing effort is made to consolidate national forests and other land units administered by the Forest Service, through land exchange and purchase. Changes in national forests and associated areas during fiscal 1958 are as follows:

	Continental United States (acres)	*Alaska and Puerto Rico (acres)*	*Total (acres)*
Areas as of June 30, 1957	160, 266, 873	[1] 20, 773, 660	181, 040, 533
Increases:			
(1) Purchased	14, 034		14, 034
(2) Conveyed to United States in exchange	21, 059		21, 059
(3) Donated to United States	415		415
(4) Transferred from other Federal agencies	3, 603		3, 603
(5) Reserved from public domain	26, 006	1, 811	27, 817
(6) Recomputations, adjustments, and miscellaneous	4, 474		4, 474
Total	69, 591	1, 811	71, 402
Reductions:			
(1) Conveyed by United States in exchange	13, 045		13, 045
(2) Grants, sales, reconveyances, mining patents, homesteads, etc	6, 774	83	6, 857
(3) Transferred to other Federal agencies	2, 778		2, 778
(4) Eliminated from national forests and returned to public domain status		30	30
(5) Recomputations adjustments, and miscellaneous	5, 076	4	5, 080
Total	27, 673	117	27, 790
Area as of June 30, 1958	160, 308, 791	20, 775, 354	[1] 181, 084, 145

[1] Includes experimental areas, and land utilization projects administered by Forest Service prior to Jan. 2, 1954. Does not include land utilization projects transferred to the Forest Service from Soil Conservation Service on Jan. 2, 1954.

For more effective and economical administration, the Nevada National Forest in Nevada was abolished and the land was included in the Humboldt and Toiyabe National Forests. Boundaries of the Siskiyou National Forest in Oregon were modified to exclude about 249,000 acres of private and former national-forest land.

Exchanges and Purchases

Sixty-nine exchange transactions were approved, authorizing exchange of 36,194 acres of national-forest or other lands for 30,353 acres of State, county, or private land within national-forest boundaries. When these exchanges have been completed, they will help block in national-forest land as well as consolidate non-Federal properties. Studies indicate that about 1.4 million acres of isolated, scattered, or checkerboard national-forest land should be exchanged for intermingled land in other ownerships.

In an interchange of Federal land, the Department of Defense received 2,778 acres of national-forest land for use in connection with Fort Leonard Wood and 2,784 acres of military lands were added to the Mark Twain National Forest.

Approved for purchase under the Weeks law were 69 tracts containing 7,169 acres. Included are 785 acres of Indian lands within the Chippewa National Forest in Minnesota. The other lands to be purchased are needed to assure rights-of-way to national-forest land, reduce fire hazards, prevent damage to nearby public property, reduce need for property line surveys, and protect reservoirs.

Purchase approval was obtained for 2,348 acres in the Boundary Waters Canoe Area, Superior National Forest, Minn., to help preserve this wilderness canoe area.

Rights-of-Way

As national-forest resource management activities increase and intensify, there is growing need, particularly in the Western States, for rights-of-way over intermingled or surrounding land in other ownerships. Roads are needed to provide access to timber that is ready for market and to meet the increasing demands for other public use. In some cases roads are built jointly by the Government and the private landowner or the holder of timber-cutting rights upon the private lands. In other cases public needs can be met by obtaining a right to use roads that have been built by private landowners. About 400 individual transactions are initiated each year to obtain rights-of-way over private lands or existing private roads on such lands.

Survey of Land Lines

Of 226,000 miles of property lines between national-forest and non-Federal lands, only one-third have been adequately surveyed and marked. In 1957 an accelerated program to complete this work was started. During 1958, 5,700 miles of line were marked. A land corner evaluation and monumentation project was started in 1958, and 1,871 corners were investigated and evaluated. Sufficient evidence was found to permit monumenting 1,105 of these as official corners.

LAND UTILIZATION PROJECTS

Submarginal or depleted farm, forest, and watershed lands were acquired by the Federal Government during the years 1934 to 1942. To bring them back into use, good conservation practices have been applied. These lands are called land utilization projects.

About 1½ million acres were transferred to the Forest Service before 1954. Most of this land has been given national-forest status, and all of it has been administered along with the national forests. More than 7 million acres of land utilization lands were managed by Soil Conservation Service, but on January 2, 1954, these were transferred to the Forest Service for management under the Bankhead-Jones Farm Tenant Act. About 800,000 acres were under long-term (99 year) lease to public agencies and most of these lands have been transferred to these agencies.

Transfer and Sale

In 1958 more than 2 million acres of land utilization lands were transferred to the Department of the Interior for use in the programs of the Bureau of Land Management and the Fish and Wildlife Service. Included were 1,935,850 acres in Montana, 239,000 acres in New Mexico, 7,700 acres in Texas, and 4,350 acres in California.

North Carolina and Florida agreed to buy a total of 128,193 acres of land utilization land. This is timberland suitable for production of timber, management for wildlife habitat, and recreation use. Under the sales agreements this land will continue to be used for public purposes.

Changes in acreages of land utilization projects (those transferred to Forest Service on January 2, 1954) from July 1, 1957, to December 31, 1958, are given below:

	Continental United States (acres)
Areas as of June 30, 1957	6,819,678
Increases:	
(1) Conveyed to United States in exchange	5,129
(2) Transferred from other Federal agencies	7,338
(3) Recomputations and adjustments	374
Total	12,841
Reductions:	
(1) Conveyed by United States in exchange	4,441
(2) Grants, sales, and mining patents	239
(3) Transfers to other Federal agencies	2,187,131
(4) Recomputations and adjustments	112
Total	2,191,923
Areas as of Dec. 31, 1958	4,640,596

Management of Land Utilization Projects

On December 31, 1958, the Forest Service was managing about 4.6 million acres of land utilization project land. This land is used for grazing, timber production, recreation, wildlife habitat, and mineral mining; it also has value as watershed. About 2½ million acres are leased under short-term contracts to livestock grazing associations, soil conservation districts, and other local agencies. Protection and development of the land and its resources are required under the contracts. Concessionaires lease major recreational developments and pay the Government a portion of their gross annual income. The Bureau of Land Management, Department of the Interior, handles the mineral leases and permits.

Nonleased rangeland is used by livestock owners under permits. On forest land, merchantable trees are marked and sold to private operators through competitive bids.

Receipts from land utilization projects for fiscal 1958 are summarized as follows:

Grazing	$697,315
Timber and forest products	574,825
Mineral leases and permits	917,654
Recreation	27,327
Cropping, haying, and seed harvest	59,347
Other	14,307
Total	2,290,775

Counties in which land utilization lands are located receive 25 percent of receipts from these lands. These payments are used for schools and roads.

Program Planning and Legislation

Timber for the Future

"Timber Resources for America's Future" was released March 30, 1958. It is the result of a nationwide appraisal started by the Forest Service in 1952, released in preliminary form in 1955. Following widespread review and comment, it was revised in 1957. The planning and field surveys in connection with the study were carried out with the advice and assistance of State foresters, other State agencies, forest industries, and many public and private organizations. These outside contributions were valued at more than half a million dollars.

Small Ownerships Involved

Meeting future timber needs will call for intensifying forestry practices on all forest lands, particularly on lands held by 4½ million farmers and other small forest owners. About half of these own less than 30 acres each. Together the small owners have 265 million acres, or 55 percent of the Nation's total commercial forest land. Ninety-three percent of the land in small holdings is in the East. These lands have one-third of all the standing timber in the Nation and produce more than 40 percent of the Nation's timber products.

In general, the small ownership lands are not very productive. Most of them have little or no management. About 43 million acres need to be planted. Less than 1 percent of the planting job is being done each year. The protection job is far from adequate. Very little timber stand improvement work has been done. The portion of recently cut areas left in good productive condition is about half that on other ownerships.

About half of America's future timber supply must come from the small forest holdings. Their annual sawtimber growth must be doubled—from 26 to nearly 52 billion board feet. Growth per acre must be stepped up, from 97 to 195 board feet. The big job is to step up softwood sawtimber growth about three times. Improving the condition of these small forest properties to make them contribute their full share of wood is the number one timber problem in the country today.

LEGISLATIVE REPORTING

In 1958 Congress considered about 600 bills that would affect Forest Service activities, and the Service prepared 138 legislative reports. Congress passed 34 bills of general interest to all Federal agencies and 30 of special interest to the Forest Service.

Public Law 85–731, amendment of the Klamath Termination Act, provides for sale of the part of the tribal forest that must be sold to pay the Indians who have elected to withdraw from the tribe. About 600,000 acres in 10 to 15 units will be offered for sale to private purchasers who agree to manage them according to sustained-yield procedures so as to furnish a continuous supply of timber. Plans for sustained-yield management are to be prepared by purchasers for approval of and enforcement by the Secretary of Agriculture. Forest units not sold before April 1, 1961, will be bought by the United States and will become national-forest lands. In addition, lands that revert because of breach of sale conditions will become national-forest lands. These lands would be subject to the laws applicable to land acquired under the Weeks law.

Under Public Law 85–569, certain areas (not exceeding 640 acres) of national forests and lands administered under title III of the Bankhead-Jones Farm Tenant Act can be set aside as townsites. These would be divided into town lots to be offered at public sale to the highest bidder. Price would not be less than the appraised value.

Public Law 85–862 gives Weeks law status to about 1.4 million acres of Federal land within national-forest boundaries. These lands were acquired for or in connection with the national forests or were placed under the jurisdiction of the Forest Service for administration substantially in accordance with national-forest regulations, policies, or procedures. This act simplifies administration of the national forests and facilitates landownership adjustments.

Administration

Through stepped-up training programs and better and more streamlined procedures, administrative management helped employees do a better job faster and more efficiently. Revision of the Forest Service Manual was completed and the Handbook was written. Long-range training needs were determined and a 5-year personnel-development program was prepared.

MANUAL AND HANDBOOK

The Forest Service Manual and Handbook contain information employees need on organization, program objectives, policies, and responsibilities; authorizations; and procedures for performing work. Together the Manual and Handbook amount to about 10,000 printed pages. Sections

on "State and Private Forestry" and "Forest Research" were included in this revision.

PERSONNEL

Forest Service personnel on June 30, 1958, totaled 12,219 permanent yearlong and 12,815 temporary seasonal employees.

During 1958, 128 people retired—optionally or because they reached mandatory retirement age. They averaged 28.8 years of service and 61.8 years of age. Thirty-two persons retired because of disability.

Injury Rate Down

Injury frequency rate reached a new low in 1958—6.65 injuries (per million man-hours of work) as compared with 8.01 injuries in 1957. In lives lost it was a tragic year: 13 employees were killed on the job, in comparison with 4 the previous year. Injury severity was 1,792.47 (man-days lost per million man-hours of work).

Employee Development

The employment development program was improved and intensified during the year. New policies and objectives were defined in the publication, "We Too Can Grow." Emphasis was given to development through individual career plans. Self-improvement was stressed and specialized group training perfected.

Ranger District Study

During fiscal 1958 a study was made to determine the proper size of ranger districts. From this study, policy and guides were established for realining, dividing, or combining districts to improve national-forest resource management and development and to provide better service to national-forest users. As a result, 25 new ranger districts were established and 3 were eliminated through consolidation with other districts.

CONTROLS

The Forest Service carries out its overall mission through the work performed by its employees in the various organizational units. To assure that these units work together toward a common goal while at the same time following the requirements of law, regulation, policy, and procedure, control measures are a part of established Forest Service functions. The controls include assigning responsibilities, delegating authorities, and a system of checking to determine whether responsibilities are met within the authority delegated. Included in the system of checking are the following:

(a) *Functional Inspections.*—These are made for responsible program officers, and include checking into the work done under individual functional programs.

(b) *General Research Inspections.*—These are made for the Assistant Chief in Charge of Research to determine the effectiveness of Forest Service research activities at the several experiment stations and the Forest Products Laboratory.

(c) *General Integrating Inspections.*—These are made for the Chief of the Forest Service to provide a check on the integrated handling of all national-forest, State and private forestry, and research programs which are administered by the respective regional foresters and experiment station directors. Primarily the generally integrating inspection is an overall evaluation of the state of the Forest Service in the various regions and stations.

(d) *Internal Audit.*—This unit independently appraises operational, managerial, and financial activities of the Forest Service. It operates on a Service-wide basis through a central staff in the Washington office and three field offices. The unit, established in 1957, made audits during 1958 of 5 Forest Service regions, 4 experiment stations, the Forest Products Laboratory, 23 national forests, and 2 research centers.

RECEIPTS AND EXPENDITURES

Receipts from the national-forest resources amounted to $91,545,820 in fiscal 1958. Sources of the receipts were as follows:

Timber	$86,274,611
Grazing	3,013,930
Other	2,257,279
Total	91,545,820

The above includes receipts of $2,572,117 from national-forest revested Oregon and California Railroad grant lands.

Other revenue included $2,290,775 from land utilization areas (title III of the Farm Tenant Act); $875,072 contributed by cooperators and timber purchasers for work on national-forest programs; $7,634,372 set aside for timber sale area betterment; $3,766,312 set aside for brush disposal; and $917,183 from miscellaneous receipts.

Receipts from all sources totaled $107,029,534. In addition, the value of roads built by timber purchasers through allowances in selling prices of timber was estimated at $35,783,094. Operating expenses for national-forest programs and land utilization projects amounted to $73,810,587, and depreciation on roads, trails, and other improvements was estimated at $20,553,000. Receipts and other income exceeded operating expenditures and other charges by $48,449,041 for fiscal 1958.

Expenditures for other Forest Service activities included $21,983,570 for cooperative State and private forestry programs and $13,121,796 on forest research.

Under the act of May 23, 1908, as amended, 25 percent of national-forest gross receipts is paid to States for schools and roads within counties having national-forest land. In fiscal 1958 this amounted to $26,975,307. Under the act of June 20, 1910, $105,474 was paid to Arizona and New Mexico school funds, and $47,951 was paid to the State of Minnesota under the act of June 22, 1948.

Counties were paid $558,249 from receipts for land utilization areas under title III of the Bankhead-Jones Farm Tenant Land Act. Approximately $2,671,299, 75 percent of the receipts from revested Oregon and California Railroad grant lands, now national-forest land, was paid to the counties in which the lands are located, as provided by the act of June 24, 1954.

Ten percent of the receipts from national-forest resources, except receipts from revested O. and C. lands, is appropriated to the Forest Service for expenditure on roads and trails within the national forests. This amounted to $10,790,988 in fiscal 1958.

Statistical Tables

TABLE 1.—*National-forest and other lands administered by the Forest Service, as of June 30, 1958*

[Acres]

States and Territories	National forest land	Land utilization projects	Other land	Total
Alabama	620, 734	10, 777	661	632, 172
Arizona	11, 328, 496		52, 604	11, 381, 100
Arkansas	2, 364, 429	61, 846	1, 686	2, 427, 961
California	19, 941, 076	23, 472	4, 696	19, 969, 244
Colorado	13, 725, 338	636, 085		14, 361, 423
Florida	1, 074, 546	114, 156		1, 188, 702
Georgia	666, 659	116, 704		783, 363
Idaho	20, 274, 526	49, 770		20, 324, 296
Illinois	210, 953			210, 953
Indiana	117, 118	3, 180		120, 298
Iowa	4, 749	946		5, 695
Kansas		106, 585		106, 585
Kentucky	458, 468			458, 468
Louisiana	560, 571	31, 155		591, 726
Maine	45, 862	725	3, 694	50, 281
Massachusetts			1, 651	1, 651
Michigan	2, 550, 371	7, 484		2, 557, 855
Minnesota	2, 782, 274			2, 782, 274
Mississippi	1, 047, 089	85, 518	1, 211	1, 133, 818
Missouri	1, 360, 691	12, 938		1, 373, 629
Montana	16, 635, 476	1, 935, 853		18, 571, 329
Nebraska	206, 082	133, 634		339, 716
Nevada	5, 057, 912			5, 057, 912
New Hampshire	677, 404			677, 404
New Mexico	8, 553, 110	663, 343	8, 792	9, 225, 245
New York		13, 747		13, 747
North Carolina	1, 123, 337	14, 037		1, 137, 374
North Dakota	520	1, 104, 012		1, 104, 532
Ohio	106, 089			106, 089
Oklahoma	183, 319	81, 269		264, 588
Oregon	14, 828, 216	105, 925		14, 934, 141
Pennsylvania	470, 837			470, 837
South Carolina	587, 278			587, 278
South Dakota	1, 119, 148	885, 127		2, 004, 275
Tennessee	594, 768	1, 212		595, 980
Texas	657, 994	124, 945		782, 939
Utah	7, 809, 140	53, 404	62, 666	7, 925, 210
Vermont	230, 366			230, 366
Virginia	1, 445, 008	2, 683		1, 447, 691
Washington	9, 688, 940			9, 688, 940
West Virginia	903, 137			903, 137
Wisconsin	1, 466, 548		17	1, 466, 565
Wyoming	8, 566, 134	573, 386		9, 139, 520
Alaska	20, 742, 290			20, 742, 290
Puerto Rico	33, 037	27		33, 064
Total	180, 820, 040	6, 953, 945	137, 678	187, 911, 663

TABLE 2.—*Area of commercial timberland, volume of sawtimber, and total timber volume in the national forests, Jan. 1, 1958*

States and Territory	Commercial forest land	Sawtimber volume	Total timber volume [1]
	Thousand acres	*Million board feet*	*Million board feet*
Alabama	614	1, 506	2, 224
Arizona	2, 280	13, 547	14, 772
Arkansas	2, 293	3, 973	6, 532
California	8, 483	134, 107	137, 578
Colorado	6, 267	20, 484	28, 762
Florida	1, 030	665	2, 749
Georgia	646	1, 314	2, 014
Idaho	9, 280	69, 653	91, 834
Illinois	184	385	560
Indiana	112	162	373
Kentucky	439	1, 272	2, 453
Louisiana	541	1, 240	1, 990
Maine	51	55	136
Michigan	2, 415	1, 419	6, 164
Minnesota	2, 193	1, 987	6, 558
Mississippi	1, 025	2, 467	3, 938
Missouri	1, 339	997	1, 220
Montana	10, 493	39, 833	67, 718
Nebraska	30		
Nevada	178	107	129
New Hampshire	452	858	2, 131
New Mexico	3, 202	8, 384	9, 055
North Carolina	975	2, 253	3, 086
Ohio	88	145	342
Oklahoma	176	211	611
Oregon	10, 707	204, 986	225, 471
Pennsylvania	451	553	3, 081
South Carolina	566	1, 600	2, 700
South Dakota	990	2, 190	3, 066
Tennessee	587	1, 093	2, 293
Texas	640	2, 558	3, 953
Utah	2, 153	11, 843	16, 965
Vermont	199	665	1, 048
Virginia	1, 087	1, 611	5, 859
Washington	5, 477	122, 817	137, 344
West Virginia	869	1, 605	3, 794
Wisconsin	1, 367	1, 048	4, 116
Wyoming	3, 240	17, 511	24, 653
Alaska	5, 375	158, 970	169, 888
Total	88, 494	836, 074	997, 160

[1] Net volume of all live trees 5 inches d.b.h. and larger.

TABLE 3.—*Volume and value of timber cut from the national forests, and area planted and seeded to trees, fiscal year 1958*

States and Territories	Timber cut		Area planted and seeded to trees	
	Volume	Value	Fiscal year 1958	Total through June 30, 1958
	Thousand board feet	*Dollars*	*Acres*	*Acres*
Alabama	54, 792	1, 014, 627	1, 707	47, 570
Arizona	174, 008	1, 571, 189	40	2, 997
Arkansas	136, 440	2, 968, 560	445	16, 713
California	946, 559	11, 821, 083	6, 892	73, 067
Colorado	125, 426	702, 370	452	69, 353
Florida	63, 196	797, 088	10, 774	33, 378
Georgia	46, 849	1, 066, 473	3, 746	19, 059
Idaho	513, 348	4, 191, 464	2, 135	107, 167
Illinois	3, 643	41, 428	933	43, 136
Indiana	1, 531	11, 981	792	19, 804
Iowa	12	73	----	----
Kentucky	17, 692	199, 351	179	812
Louisiana	50, 199	761, 171	4, 352	108, 266
Maine	1, 852	27, 781	----	67
Michigan	120, 705	707, 689	3, 875	561, 107
Minnesota	133, 439	600, 429	4, 110	146, 731
Mississippi	104, 110	1, 754, 493	4, 143	154, 274
Missouri	27, 548	172, 463	2, 971	70, 597
Montana	395, 465	3, 204, 069	1, 526	46, 546
Nebraska	6	38	----	30, 019
Nevada	199	872	33	397
New Hampshire	11, 282	132, 620	3	1, 156
New Mexico	62, 122	478, 719	54	3, 030
North Carolina	46, 843	740, 614	3, 169	15, 551
North Dakota	94	1, 314	----	----
Ohio	4, 196	39, 424	1, 503	14, 313
Oklahoma	14, 518	172, 939	20	77
Oregon	1, 740, 589	37, 480, 749	17, 614	146, 218
Pennsylvania	16, 410	245, 788	232	18, 129
South Carolina	51, 226	1, 274, 618	429	18, 919
South Dakota	37, 581	249, 801	1, 230	34, 490
Tennessee	17, 722	290, 926	390	6, 102
Texas	102, 157	2, 178, 432	611	50, 037
Utah	48, 226	211, 062	2	4, 033
Vermont	5, 269	86, 075	----	1, 406
Virginia	40, 733	260, 921	131	4, 590
Washington	944, 661	17, 335, 087	13, 266	154, 365
West Virginia	20, 478	177, 926	51	15, 984
Wisconsin	68, 047	386, 896	787	226, 769
Wyoming	71, 521	364, 771	108	7, 623
Alaska	199, 893	463, 517	280	290
Puerto Rico	114	1, 082	----	12, 706
Total	6, 420, 701	94, 187, 973	88, 985	2, 286, 848

TABLE 4.—*Number of livestock permitted to graze on the national forests, calendar year 1958*

States and Territory	Cattle, horses, and swine		Sheep and goats	
	Paid permits	Livestock	Paid permits	Livestock
Alabama	4	785	0	0
Arizona	885	145, 247	35	75, 217
Arkansas	132	1, 742	0	0
California	1, 166	110, 107	73	98, 258
Colorado	1, 703	145, 477	462	515, 358
Florida	16	1, 622	0	0
Georgia	13	96	0	0
Idaho	1, 792	108, 887	328	582, 293
Illinois	13	135	0	0
Indiana	3	10	0	0
Iowa	7	141	0	0
Louisiana	63	1, 897	0	0
Michigan	49	848	1	50
Minnesota	30	284	1	18
Mississippi	105	1, 524	0	0
Missouri	286	3, 262	0	0
Montana	1, 706	117, 581	129	190, 408
Nebraska	53	12, 040	0	0
Nevada	245	54, 778	45	125, 717
New Mexico	1, 652	78, 166	131	66, 559
North Carolina	9	135	0	0
Ohio	16	42	0	0
Oklahoma	4	20	0	0
Oregon	874	70, 669	99	129, 867
Pennsylvania	1	25	0	0
South Carolina	14	496	0	0
South Dakota	536	21, 151	21	10, 651
Tennessee	10	169	0	0
Texas	158	1, 330	0	0
Utah	2, 677	101, 708	675	433, 330
Vermont	5	48	0	0
Virginia	9	99	3	106
Washington	430	23, 776	16	18, 730
West Virginia	71	720	15	683
Wisconsin	4	21	1	45
Wyoming	1, 021	109, 291	198	361, 490
Alaska	0	52	0	0
Total	15, 762	1, 114, 381	2, 233	2, 608, 780

TABLE 5.—*Estimated number*[1] *of big-game animals on the national forests, as of Apr. 30, 1958*

States and Territory	Deer	Elk	Bear	Bighorn	Total big game[2]
Alabama	5, 500		2		5, 500
Arizona	112, 000	5, 700	1, 100	50	143, 000
Arkansas	17, 000	50	40		17, 000
California	640, 000	310	17, 000	610	661, 000
Colorado	238, 000	51, 000	7, 700	2, 900	300, 000
Florida	16, 000		270		16, 000
Georgia	6, 600		70		6, 700
Idaho	181, 000	71, 000	12, 000	2, 800	277, 000
Illinois	7, 700				7, 700
Indiana	850				850
Kentucky	4, 100		11		4, 100
Louisiana	3, 700				3, 700
Maine	500		20		520
Michigan	168, 000		3, 500		172, 000
Minnesota	64, 000		3, 800		69, 000
Mississippi	15, 000				15, 000
Missouri	37, 000		5		37, 000
Montana	222, 000	41, 000	8, 500	1, 600	288, 000
Nebraska	450				450
Nevada	105, 000	580	60	180	106, 000
New Hampshire	2, 300		430		2, 700
New Mexico	104, 000	3, 200	1, 400	55	111, 000
North Carolina	28, 000		1, 200		30, 000
Ohio	3, 000				3, 000
Oklahoma	1, 000				1, 000
Oregon	303, 000	38, 000	9, 300		351, 000
Pennsylvania	43, 000		340		43, 000
South Carolina	5, 700		5		5, 700
South Dakota	83, 000	200			84, 000
Tennessee	6, 700		250		7, 600
Texas	7, 200				7, 200
Utah	277, 000	6, 100	520	10	284, 000
Vermont	13, 000		400		13, 000
Virginia	80, 000	170	2, 000		82, 000
Washington	109, 000	20, 000	13, 000		148, 000
West Virginia	22, 000		280		22, 000
Wisconsin	79, 000		2, 300		81, 000
Wyoming	84, 000	39, 000	2, 000	2, 900	134, 000
Alaska	98, 000	750	25, 000	1, 000	138, 000
Total	3, 200, 000	277, 000	113, 000	12, 000	3, 680, 000

[1] Figures rounded in posting and totals.
[2] Also includes antelope, moose, mountain goat, peccary, and wild boar.

TABLE 6.—*Construction, reconstruction, and maintenance of national-forest (forest development) roads, bridges, and trails, fiscal year 1958*

States and Territories	Roads		Bridges, construction, reconstruction, and replacement	Trails		Total obligations from all funds [1]
	Construction and reconstruction	Existing		Construction and reconstruction	Existing	
	Miles	*Miles*	*Number*	*Miles*	*Miles*	*Dollars*
Alabama	8.8	1,396.2	3	0	0	192,616
Arizona	12.6	8,922.4	21	0	3,621.6	1,107,143
Arkansas	20.9	4,033.3	3	0	0	505,858
California	115.1	25,982.8	32	38.6	15,490.0	8,663,013
Colorado	73.0	6,934.2	18	2.5	9,244.0	1,765,363
Florida	15.3	1,450.8	17	0	0	208,367
Georgia	5.2	1,674.4	1	0	182.2	232,444
Idaho	118.1	14,231.4	77	17.5	22,528.7	7,565,566
Illinois	0.2	731.4	0	0	0	74,723
Indiana	0	299.5	0	0	0	18,135
Iowa	0	0	0	0	0	0
Kentucky	12.6	1,197.7	0	0	16.0	299,281
Louisiana	6.9	1,161.6	10	0	0	192,136
Maine	0	47.0	0	0	78.5	8,318
Michigan	11.1	3,628.7	5	0	0	564,859
Minnesota	16.8	2,351.3	9	0	476.7	1,026,897
Mississippi	11.0	2,937.8	1	0	0	493,229
Missouri	2.7	2,323.6	1	0	0	147,986
Montana	50.0	10,274.9	47	8.0	16,100.6	2,843,257
Nebraska	0.3	239.8	0	0	0	7,980
Nevada	0.6	2,787.3	7	0	1,739.0	111,735
New Hampshire	3.9	155.2	1	0	1,068.7	170,087
New Mexico	14.2	5,804.8	14	0	3,403.3	1,287,200
North Carolina	12.9	2,724.5	3	0	1,208.3	305,149
North Dakota	0	0.3	0	0	0	0
Ohio	0	234.6	0	0	0	5,344
Oklahoma	0	274.1	0	0	0	27,233
Oregon	71.5	17,252.2	61	60.8	11,392.3	6,873,213
Pennsylvania	1.4	335.5	0	0	167.8	151,625
South Carolina	15.0	1,449.0	2	0	0	170,532
South Dakota	12.7	3,755.3	4	0	0	228,247
Tennessee	8.1	1,035.6	0	0	507.1	323,038
Texas	16.8	1,640.2	2	0	0	214,606
Utah	67.5	5,494.0	14	0	7,409.0	774,880
Vermont	2.2	230.4	0	0	162.4	124,074
Virginia	10.2	1,479.0	1	0	787.8	393,285
Washington	24.8	8,056.8	57	47.4	9,319.6	4,598,668
West Virginia	10.4	1,302.4	4	0	767.9	239,693
Wisconsin	8.0	1,789.5	6	0	0	391,514
Wyoming	64.2	3,834.1	14	1.0	5,872.4	1,163,585
Alaska	14.1	172.4	2	.4	622.6	766,266
Puerto Rico	0	24.3	0	3.7	28.6	8,439
Total	839.1	149,650.3	437	179.9	112,205.4	44,245,584

[1] Total obligations are for construction, reconstruction, and maintenance.

TABLE 7.—*Use of recreation resources on the national forests, calendar year 1958*

State and Territories	Number of visits to—								
	Campgrounds	Picnic areas	Winter sports areas	Organization camps	Hotels or resorts	Recreation residences	Wilderness areas	Other forest areas	Total
Alabama	700	74, 000	0	1, 100	0	0	0	68, 700	144, 500
Arizona	465, 000	1, 281, 600	58, 200	32, 100	272, 400	36, 700	10, 300	1, 313, 800	3, 470, 100
Arkansas	29, 400	248, 300	0	21, 100	22, 300	0	0	1, 042, 800	1, 363, 900
California	2, 423, 700	1, 727, 900	1, 506, 900	251, 500	535, 700	325, 600	197, 400	5, 503, 000	12, 471, 700
Colorado	1, 147, 400	1, 679, 200	391, 600	15, 000	963, 500	50, 900	19, 000	2, 992, 000	7, 258, 600
Florida	47, 000	383, 600	0	44, 900	700	11, 300	0	331, 000	818, 500
Georgia	75, 500	547, 900	0	3, 000	5, 000	3, 200	0	375, 200	1, 009, 800
Idaho	461, 000	429, 800	209, 900	22, 000	101, 900	32, 800	35, 600	1, 264, 300	2, 557, 300
Illinois	400	126, 000	0	0	0	0	0	213, 000	339, 400
Indiana	300	20, 000	0	0	0	0	0	72, 000	92, 300
Kentucky	22, 000	131, 000	0	5, 300	28, 000	4, 000	0	345, 000	535, 300
Louisiana	0	48, 000	0	0	0	7, 000	0	85, 000	140, 000
Maine	0	12, 000	0	0	0	0	0	25, 000	37, 000
Michigan	69, 200	215, 000	132, 000	12, 000	4, 500	7, 600	0	1, 338, 000	1, 778, 300
Minnesota	144, 000	102, 000	6, 200	4, 300	17, 400	10, 000	104, 000	874, 000	1, 261, 900
Mississippi	4, 100	95, 000	0	6, 500	0	0	0	412, 600	518, 200
Missouri	6, 700	93, 000	0	6, 700	0	0	0	883, 000	989, 400
Montana	276, 600	391, 300	62, 700	20, 000	49, 300	56, 600	24, 900	1, 265, 000	2, 146, 400
Nebraska	1, 400	42, 000	0	0	0	0	0	6, 400	49, 800
Nevada	107, 800	156, 300	47, 000	7, 600	0	1, 100	100	112, 400	432, 300
New Hampshire	73, 000	317, 000	135, 000	2, 800	66, 500	0	0	770, 000	1, 364, 300
New Mexico	322, 300	910, 000	44, 800	12, 300	1, 800	8, 900	12, 600	855, 200	2, 187, 900
North Carolina	375, 200	899, 400	0	11, 700	11, 500	2, 300	41, 000	1, 374, 700	2, 715, 800
Ohio	1, 700	56, 000	0	0	0	0	0	77, 000	134, 700
Oklahoma	100	29, 500	0	0	0	0	0	9, 900	39, 500
Oregon	1, 009, 800	904, 700	421, 000	32, 900	1, 626, 700	59, 700	32, 700	893, 100	4, 980, 600
Pennsylvania	3, 400	109, 400	0	12, 200	0	3, 900	0	688, 000	816, 900
South Carolina	300	290, 300	0	0	0	0	0	180, 800	471, 400
South Dakota	235, 500	848, 700	600	11, 100	13, 000	18, 000	0	909, 500	2, 036, 400
Tennessee	65, 900	914, 400	0	23, 300	38, 000	24, 500	0	707, 800	1, 773, 900
Texas	7, 100	131, 500	0	800	0	0	0	120, 200	259, 600
Utah	648, 400	2, 748, 500	358, 700	61, 800	64, 800	60, 000	29, 600	999, 000	4, 970, 800
Vermont	3, 000	50, 000	250, 000	0	0	0	0	36, 000	339, 000
Virginia	52, 600	299, 300	0	11, 100	0	600	0	1, 760, 500	2, 124, 100
Washington	685, 100	811, 200	412, 700	49, 800	122, 400	58, 200	7, 200	930, 900	3, 077, 500
West Virginia	175, 300	156, 700	0	5, 000	0	0	0	379, 000	716, 000
Wisconsin	35, 500	127, 000	12, 800	5, 400	300	1, 600	0	335, 000	517, 600
Wyoming	285, 500	264, 100	68, 700	21, 700	104, 200	42, 000	41, 700	940, 200	1, 768, 100
Alaska	62, 800	122, 000	8, 200	1, 700	5, 400	20, 300	0	352, 000	572, 400
Puerto Rico	0	51, 600	0	8, 000	62, 000	3, 600	0	43, 100	168, 300
Total	9, 324, 700	17, 845, 200	4, 127, 000	724, 700	4, 117, 300	850, 400	556, 100	30, 904, 100	68, 449, 500

TABLE 8.—*Fires controlled by national-forest fire organizations to protect national-forest lands, and area burned, calendar year 1958*

States and Territory	Fires						Area burned	
	Lightning	Campfire	Smoker	Incendiary	Other causes	Total [1]	National forest	Other ownerships [2]
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Acres*	*Acres*
Alabama	6	6	40	46	44	142	345	400
Arizona	1, 130	64	62	5	61	1, 322	2, 352	79
Arkansas	15	4	29	13	39	100	482	219
California	1, 727	58	206	38	316	2, 345	51, 887	6, 764
Colorado	131	104	68		41	344	1, 331	576
Florida	25	4	27	15	26	97	725	198
Georgia	1	10	12	13	28	64	263	96
Idaho	976	58	61	1	74	1, 170	4, 017	3, 123
Illinois		1	9	6	30	46	173	365
Indiana			1		8	9		59
Kentucky	1	2	5	3	20	31	169	97
Louisiana	1	5	16	36	18	76	1, 533	461
Maine								
Michigan	7	16	59	2	81	165	507	306
Minnesota	12	26	31	22	41	132	745	729
Mississippi	2	6	52	127	53	240	2, 427	1, 012
Missouri	2	17	41	37	182	279	505	916
Montana	392	47	37		80	556	2, 288	1, 164
Nebraska	1					1	700	
Nevada	34	4	14	5	12	69	1, 256	299
New Hampshire	3	2	1		4	10		
New Mexico	548	41	24		26	639	255	31
North Carolina	1	9	31	28	33	102	748	816
Ohio		1	15	12	33	61	128	257
Oklahoma	3	1	1		2	7	6	
Oregon	959	91	124	1	107	1, 282	2, 843	1, 026
Pennsylvania			4		6	10	152	2
South Carolina		3	20	36	34	93	330	283
South Dakota	54	5	8	2	24	93	327	128
Tennessee	2	5	17	47	31	102	757	482
Texas		4	18	6	35	63	89	65
Utah	149	71	52	8	40	320	2, 270	756
Vermont					1	1		
Virginia	3	2	19	14	67	105	183	198
Washington	560	93	62		69	784	5, 447	8, 540
West Virginia			2	1	6	9		7
Wisconsin		5	13	3	17	38	122	65
Wyoming	80	29	20		12	141	425	326
Alaska	1	13	4		19	37	821	
Total	6, 826	807	1, 205	527	1, 720	11, 085	86, 608	29, 845

[1] Includes 8,251 fires on national-forest land and 2,834 on lands in other ownerships within and adjacent to the national forests.

[2] Within and adjacent to the national forests.

TABLE 9.—*Forest fires on protected State and private lands, and area burned, calender year 1958; and expenditures for control, fiscal year 1958*

States and Territory	Area protected	Fires	Area burned	Prevention and suppression expenditures			
				Federal	State and county	Private [1]	Total
	Thousand acres	*Number*	*Acres*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Alabama	19, 990	5, 738	84, 494	362, 900	741, 692	143, 153	1, 247, 745
Arkansas	16, 535	2, 008	30, 413	278, 000	737, 276	87, 431	1, 102, 707
California	19, 810	3, 109	163, 918	1, 268, 600	12, 016, 637	----------	13, 285, 237
Colorado	7, 404	268	42, 893	30, 400	71, 176	----------	101, 576
Connecticut	1, 989	465	1, 107	44, 600	206, 153	----------	250, 753
Delaware	453	20	29	12, 400	15, 110	----------	27, 510
Florida	16, 934	4, 530	56, 395	603, 400	2, 996, 745	129, 854	3, 729, 999
Georgia	21, 365	7, 013	58, 732	550, 000	2, 550, 912	33, 607	3, 134, 519
Idaho	7, 343	759	68, 740	131, 200	271, 586	114, 229	517, 015
Illinois	3, 170	253	6, 719	34, 000	92, 385	----------	126, 385
Indiana	3, 931	374	8, 814	51, 700	152, 983	----------	204, 683
Iowa	2, 277	19	420	25, 000	29, 668	----------	54, 668
Kentucky	7, 553	1, 595	33, 202	113, 200	377, 030	----------	490, 230
Louisiana	11, 899	4, 595	87, 852	345, 900	1, 272, 128	19, 003	1, 637, 031
Maine	16, 973	221	1, 562	213, 900	852, 430	----------	1, 066, 330
Maryland	2, 850	241	724	101, 100	439, 485	----------	540, 585
Massachusetts	3, 252	2, 374	3, 426	120, 700	468, 945	----------	589, 645
Michigan	17, 205	1, 370	12, 307	442, 900	2, 028, 728	----------	2, 471, 628
Minnesota	17, 771	1, 219	52, 582	286, 500	761, 326	----------	1, 047, 826
Mississippi	13, 010	6, 421	90, 298	304, 700	1, 115, 350	----------	1, 420, 050
Missouri	9, 487	2, 436	27, 859	195, 800	670, 336	----------	866, 136
Montana	6, 915	256	1, 741	81, 500	100, 214	151, 078	332, 792
Nebraska	750	[2]	[2]	178	179	----------	357
Nevada	2, 216	108	12, 194	29, 900	115, 951	----------	145, 851
New Hampshire	4, 182	304	310	63, 500	212, 522	5, 523	281, 545
New Jersey	2, 095	749	3, 236	94, 100	373, 168	----------	467, 268
New Mexico	1, 394	249	1, 033	29, 900	48, 740	----------	78, 640
New York	12, 995	679	5, 924	228, 800	1, 033, 100	----------	1, 261, 900
North Carolina	16, 810	2, 491	53, 018	320, 700	1, 109, 058	31, 101	1, 460, 859
North Dakota	116	77	6, 342	5, 000	6, 613	----------	11, 613
Ohio	3, 923	979	7, 318	69, 200	249, 543	----------	318, 743
Oklahoma	3, 591	326	22, 746	89, 000	167, 322	18, 088	274, 410
Oregon	12, 141	1, 115	12, 528	579, 700	1, 566, 049	711, 077	2, 856, 826
Pennsylvania	14, 704	910	15, 516	175, 600	774, 806	----------	950, 406
Rhode Island	434	81	182	33, 700	143, 201	----------	176, 901
South Carolina	11, 175	3, 499	27, 338	278, 000	1, 177, 322	----------	1, 455, 322
South Dakota	2, 827	88	1, 231	29, 900	36, 057	----------	65, 957
Tennessee	10, 108	2, 956	20, 002	207, 100	856, 096	3, 559	1, 066, 755
Texas	9, 325	1, 274	14, 263	222, 400	510, 389	118, 071	850, 860
Utah	6, 161	308	49, 016	29, 900	50, 423	----------	80, 323
Vermont	3, 517	99	151	29, 900	101, 576	----------	131, 476
Virginia	14, 033	1, 083	4, 303	230, 300	794, 431	5, 262	1, 029, 993
Washington	12, 237	1, 639	23, 412	585, 400	1, 941, 133	302, 042	2, 828, 575
West Virginia	9, 007	1, 194	41, 244	127, 300	271, 924	36, 681	435, 905
Wisconsin	15, 297	1, 867	16, 141	342, 200	1, 392, 228	----------	1, 734, 428
Hawaii	1, 152	7	1, 279	10, 000	17, 680	----------	27, 680
Total	398, 306	67, 366	1, 172, 954	9, 410, 078	40, 917, 806	1, 909, 759	52, 237, 643

[1] Private expenditures, spent under direct supervision of State forester, as part of the Clarke-McNary program.
[2] Data incomplete.

TABLE 10.—*Distribution of forest and windbarrier planting stock by cooperating States, fiscal year 1958 (under Clarke-McNary program)*

States and Territories	Seedlings and transplants shipped	Expenditures			
		Federal funds	State appropriated funds	Receipts from sale of stock used in program	Total
	Thousands	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Alabama	44, 130	27, 000	42, 382	110, 940	180, 322
Arkansas	35, 762	9, 677	9, 677	99, 985	119, 339
California	1, 648	31, 754	38, 180	22, 474	92, 408
Colorado	397	2, 432	2, 432	14, 069	18, 933
Connecticut	1, 232	19, 641	19, 641	21, 623	60, 905
Delaware	725	6, 250	6, 884	0	13, 134
Florida	112, 192	0	0	550, 419	550, 419
Georgia	77, 512	70, 000	108, 973	698, 577	877, 550
Idaho	438	7, 159	8, 548	9, 496	25, 203
Illinois	6, 388	29, 697	53, 070	51, 954	134, 721
Indiana	6, 388	42, 200	57, 359	137, 495	237, 054
Iowa	1, 420	0	16, 101	38, 934	55, 035
Kansas	628	2, 157	2, 175	15, 886	20, 218
Kentucky	12, 640	42, 433	48, 297	80, 296	171, 026
Louisiana	56, 852	27, 000	33, 790	215, 644	276, 434
Maine	421	15, 830	15, 830	5, 590	37, 250
Maryland	4, 974	25, 265	26, 353	1, 167	52, 785
Massachusetts	1, 026	9, 337	9, 337	17, 684	36, 358
Michigan	22, 725	40, 800	119, 615	188, 430	348, 845
Minnesota	19, 312	42, 225	218, 359	104, 390	364, 974
Mississippi	36, 509	106, 592	127, 107	308, 194	541, 893
Missouri	1, 937	35, 960	39, 675	11, 643	87, 278
Montana	840	12, 526	14, 555	26, 187	53, 268
Nebraska	758	2, 498	2, 498	24, 069	29, 065
New Hampshire	1, 574	24, 816	24, 816	12, 120	61, 752
New Jersey	771	8, 879	8, 879	16, 048	33, 806
New York	30, 082	47, 432	119, 625	146, 800	313, 857
North Carolina	51, 996	21, 132	21, 132	217, 775	260, 039
North Dakota	1, 032	8, 374	8, 374	16, 705	33, 453
Ohio	11, 855	40, 805	60, 717	121, 869	223, 391
Oklahoma	2, 504	16, 917	16, 954	13, 179	47, 050
Oregon	9, 443	9, 825	12, 004	87, 428	109, 257
Pennsylvania	14, 741	42, 432	48, 219	91, 137	181, 788
Rhode Island	243	6, 769	7, 464	3, 053	17, 286
South Carolina	29, 007	39, 000	48, 248	83, 707	170, 955
South Dakota	2, 008	7, 026	7, 026	68, 368	82, 420
Tennessee	59, 664	29, 000	29, 000	169, 426	227, 426
Texas	17, 695	18, 219	18, 219	100, 709	137, 147
Utah	166	1, 036	1, 036	2, 227	4, 299
Vermont	1, 802	34, 360	34, 360	16, 955	85, 675
Virginia	38, 840	40, 000	44, 677	162, 420	247, 097
Washington	1, 606	5, 908	5, 908	15, 329	27, 145
West Virginia	5, 020	17, 484	17, 484	57, 896	92, 864
Wisconsin	36, 338	40, 000	42, 887	397, 550	480, 437
Wyoming	208	2, 333	2, 333	6, 428	11, 094
Hawaii	268	37, 500	48, 219	0	85, 719
Puerto Rico	647	23, 500	23, 500	0	47, 000
Total	764, 364	1, 131, 180	1, 671, 919	4, 562, 275	7, 365, 374

TABLE 11.—*Planting stock available for forest and windbarrier planting on State and private lands, area planted or seeded, and plantable area by States*

States and Territories	Planting stock shipped, fiscal year 1958			Area planted or seeded, fiscal year 1958 [2]	Plantable area as of Jan. 1, 1953 [3]
	State nurseries	Other	Total [1]		
	Thousands	*Thousands*	*Thousands*	*Acres*	*Acres*
Alabama	99, 396	30, 504	129, 900	112, 100	1, 675, 000
Arizona	0	0	0	9	18, 000
Arkansas	56, 045	0	56, 045	36, 545	1, 408, 000
California	3, 105	440	3, 545	2, 191	3, 357, 000
Colorado	164	48	212	1, 308	295, 000
Connecticut	1, 511	0	1, 511	1, 524	205, 000
Delaware	732	0	732	516	34, 000
Florida	133, 494	64, 600	198, 094	194, 720	4, 859, 000
Georgia	145, 656	49, 420	195, 076	187, 726	1, 566, 000
Idaho	386	0	386	907	265, 000
Illinois	8, 654	0	8, 654	7, 150	2, 856, 000
Indiana	10, 377	0	10, 377	6, 969	1, 290, 000
Iowa	919	1, 075	1, 994	1, 420	613, 000
Kansas	0	2, 790	2, 790	1, 965	915, 000
Kentucky	3, 245	0	3, 245	14, 573	1, 500, 000
Louisiana	75, 852	10, 677	86, 529	90, 564	1, 139, 000
Maine	212	300	512	1, 309	472, 000
Maryland	5, 299	0	5, 299	5, 224	250, 000
Massachusetts	1, 026	0	1, 026	1, 201	114, 000
Michigan	19, 799	41, 038	60, 837	47, 417	2, 905, 000
Minnesota	19, 312	1, 922	21, 234	19, 312	2, 410, 000
Mississippi	71, 260	5, 800	77, 060	128, 293	4, 187, 000
Missouri	4, 727	1, 000	5, 727	4, 054	1, 267, 000
Montana	685	823	1, 508	1, 652	214, 000
Nebraska	0	3, 998	3, 998	4, 752	968, 000
Nevada	30	0	30	60	28, 000
New Hampshire	1, 686	79	1, 765	1, 576	309, 000
New Jersey	1, 266	33	1, 299	827	93, 000
New Mexico	0	0	0	40	97, 000
New York	36, 896	0	36, 896	36, 696	1, 250, 000
North Carolina	83, 761	0	83, 761	71, 971	898, 000
North Dakota	1, 266	5, 863	7, 129	9, 304	742, 000
Ohio	13, 530	575	14, 105	13, 376	729, 000
Oklahoma	1, 676	0	1, 676	4, 697	876, 000
Oregon	8, 643	12, 075	20, 718	53, 463	969, 000
Pennsylvania	18, 642	35, 688	54, 330	51, 620	1, 080, 000
Rhode Island	53	0	53	350	39, 000
South Carolina	60, 846	16, 000	76, 846	66, 027	1, 169, 000
South Dakota	0	4, 650	4, 650	7, 971	702, 000
Tennessee	48, 467	31, 940	80, 407	59, 664	1, 465, 000
Texas	41, 669	24, 300	65, 969	43, 482	539, 000
Utah	94	0	94	278	37, 000
Vermont	1, 802	0	1, 802	2, 202	99, 000
Virginia	41, 373	0	41, 373	38, 839	1, 799, 000
Washington	14, 678	13, 485	28, 163	41, 172	751, 000
West Virginia	5, 237	0	5, 237	5, 054	989, 000
Wisconsin	35, 751	5, 687	41, 438	46, 038	2, 685, 000
Wyoming	0	0	0	577	95, 000
Alaska	0	0	0	0	[4]
Hawaii	268	0	268	546	[4]
Puerto Rico	668	0	668	1, 624	[4]
Total	1, 080, 158	364, 810	1, 444, 968	1, 430, 855	52, 222, 000

[1] Stock shipped is entered for State within which nursery is located. Some of this stock is used in other States.
[2] It is estimated that not more than 76 percent of these plantings and seedings are successful.
[3] These figures are those reported in "Timber Resources for America's Future."
[4] Not included in "Timber Resources for America's Future."

TABLE 12.—*Cooperative forest management accomplishments and expenditures, fiscal year 1958* [1]

States and Territory	Accomplishments				Expenditures		
	Woodland owners assisted	Woodland involved	Products harvested	Gross sale value	Federal	State	Total
	Number	*Acres*	*Thousand board feet*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Alabama	217	13, 103	1, 275	40, 265	10, 072	10, 073	20, 145
Arkansas	1, 142	83, 421	1, 384	19, 327	19, 798	19, 799	39, 597
California	859	178, 793	34, 682	543, 305	31, 420	56, 552	87, 972
Colorado	136	10, 291	1, 538	15, 422	10, 500	11, 496	21, 996
Connecticut	690	21, 214	1, 276	28, 430	19, 398	19, 398	38, 796
Delaware	48	2, 791	763	21, 450	3, 355	3, 504	6, 859
Florida	2, 342	861, 368	21, 918	512, 859	56, 570	115, 280	171, 850
Georgia	2, 323	198, 390	24, 231	644, 592	54, 190	57, 862	112, 052
Idaho	177	17, 242	4, 678	130, 886	1, 413	1, 413	2, 826
Illinois	860	22, 267	3, 592	178, 955	41, 294	43, 842	85, 136
Indiana	726	34, 909	4, 390	138, 896	12, 670	39, 750	52, 420
Iowa	534	13, 140	1, 641	37, 811	14, 698	15, 483	30, 181
Kansas	328	6, 609	733	76, 014	1, 239	1, 239	2, 478
Kentucky	979	27, 912	1, 494	50, 556	43, 875	45, 058	88, 933
Louisiana	328	39, 559	4, 219	77, 337	22, 520	24, 730	47, 250
Maine	2, 408	60, 731	14, 035	290, 834	41, 325	61, 465	102, 790
Maryland	1, 551	20, 934	8, 406	213, 673	37, 105	40, 997	78, 102
Massachusetts	197	10, 062	7, 702	77, 121	8, 590	8, 770	17, 364
Michigan	2, 239	60, 375	13, 424	322, 469	52, 367	55, 015	107, 382
Minnesota	1, 610	35, 115	7, 863	151, 628	24, 415	28, 689	53, 104
Mississippi	1, 895	180, 496	4, 217	98, 144	24, 088	24, 088	48, 176
Missouri	1, 728	169, 748	11, 249	299, 265	50, 671	58, 936	109, 607
Montana	469	34, 106	836	9, 083	14, 122	14, 405	28, 527
Nebraska	108	659	263	12, 130	3, 264	3, 264	6, 528
New Hampshire	1, 765	72, 430	5, 176	129, 093	28, 015	30, 325	58, 340
New Jersey	810	49, 508	3, 468	71, 920	25, 435	33, 284	58, 719
New York	3, 613	177, 649	29, 843	765, 372	100, 443	100, 443	200, 886
North Carolina	1, 841	66, 814	15, 146	411, 210	41, 986	41, 986	83, 972
North Dakota	21	824	313	16, 589	7, 162	7, 162	14, 324
Ohio	2, 557	51, 522	5, 855	184, 149	55, 425	62, 243	117, 668
Oklahoma	547	2, 523	71	8, 275	7, 216	7, 216	14, 432
Oregon	1, 548	58, 011	19, 073	421, 765	16, 973	16, 973	33, 946
Pennsylvania	1, 949	56, 212	6, 868	178, 211	44, 815	66, 152	110, 967
Rhode Island	198	26, 797	56	1, 057	4, 317	4, 317	8, 634
South Carolina	1, 428	155, 611	16, 408	375, 432	50, 648	58, 912	109, 560
South Dakota	139	7, 943	432	3, 045	11, 942	11, 942	23, 884
Tennessee	678	38, 546	29, 994	425, 854	25, 027	25, 027	50, 054
Texas	1, 072	123, 918	1, 330	15, 527	22, 905	22, 906	45, 811
Utah	23	2, 726	0	230	4, 541	4, 541	9, 082
Vermont	2, 476	57, 460	11, 706	336, 224	53, 040	79, 834	132, 874
Virginia	3, 604	172, 563	98, 108	1, 985, 816	86, 470	155, 959	242, 429
Washington	2, 053	65, 049	8, 257	181, 897	22, 365	31, 113	53, 478
West Virginia	1, 154	21, 804	4, 976	98, 256	33, 207	36, 776	69, 983
Wisconsin	6, 873	124, 423	11, 905	377, 973	80, 217	175, 333	255, 550
Puerto Rico	509	151	3	140	8, 000	16, 000	24, 000
Total	58, 752	3, 435, 719	444, 797	9, 978, 487	1, 329, 108	1, 749, 556	3, 078, 664

[1] Performed under authority of Cooperative Forest Management Act of Aug. 25, 1950.

TABLE 13.—*Pest control, calendar year 1958*

WHITE PINE BLISTER RUST

Ownership or management	Area surveyed	Ribes eradication program					Other treatments		
		Ribes removed and destroyed	Initial work	Rework	Maintenance work	Total area worked	Trees pruned to remove infections	Trees treated with Actidione	Total other treatments
	Acres	*Number*	*Acres*	*Acres*	*Acres*	*Acres*	*Number*	*Number*	*Number*
National forests	467, 659	6, 525, 706	20, 513	79, 547	24, 487	124, 547	2, 484	277, 550	280, 034
Interior lands	54, 781	1, 541, 415	12, 527	14, 112	7, 234	33, 873	1, 200	0	1, 200
State and private	3, 534, 905	6, 650, 374	47, 461	136, 521	80, 661	264, 643	793	16, 916	17, 709
Total	4, 057, 345	14, 717, 495	80, 501	230, 180	112, 382	423, 063	4, 477	294, 466	298, 943

OAK WILT

Ownership or management	Area surveyed aerially	Trees treated	Funds expended		
			Federal	State	Total
	Thousand acres	*Number*	*Dollars*	*Dollars*	*Dollars*
National forests	1, 550	12	1, 436	0	1, 436
State and private:					
Arkansas	1, 224	375	1, 277	3, 986	5, 263
Kentucky	4, 615	801	6, 422	12, 846	19, 268
North Carolina	1, 382	82	1, 824	3, 838	5, 662
Pennsylvania	10, 000	817	11, 364	34, 093	45, 457
Virginia	2, 624	86	3, 076	10, 372	13, 448
West Virginia	15, 411	1, 448	23, 143	59, 013	82, 156
Total	35, 256	3, 609	47, 106	124, 148	171, 254
Total, all ownerships	36, 806	3, 621	48, 542	124, 148	172, 690

INSECTS

Ownership or management	Bark beetles		Spruce budworm		Miscellaneous insects	
	Trees treated [1]	Control costs	Area treated	Control costs	Area treated	Control costs
	Number	*Dollars*	*Acres*	*Dollars*	*Acres*	*Dollars*
National forests	770, 158	1, 841, 881	849, 134	655, 183	7, 086	26, 618
Interior lands	9, 881	77, 898	33, 000	24, 486	11, 360	31, 158
State and private lands	9, 331	54, 196	367, 977	230, 172	----------	----------
Total	789, 370	1, 973, 975	1, 250, 111	909, 841	18, 446	57, 776

[1] Includes infested trees, cull logs, and stumps.

TABLE 14.—*Statement of Forest Service receipts and expenditures, all programs and sources, fiscal year 1958*

Item	Receipts	Expenditures [1]
National forest programs:		
Cash receipts and appropriation expenditures	$107,029,534	$134,024,398
Noncash income and expense (roads built by timber purchasers)	35,783,094	35,783,094
Total	142,812,628	169,807,492
Research programs:		
Forest research		12,248,969
Cooperator deposits	884,455	872,827
Total	884,455	13,121,796
State and private forestry programs:		
Cooperation with States		13,205,675
Soil Bank program		4,243,267
Assistance to States for tree planting		491,224
Insect and disease control		1,044,406
Flood prevention and watershed protection		1,306,729
Forest fire prevention, "Smokey Bear"	22,380	16,276
Cooperator deposits	1,698,642	1,675,993
Total	1,721,022	21,983,570
Work for others:		
Insect and disease control (Interior Department lands)		93,241
Cooperator funds	1,586,350	1,556,183
Other services (funds reimbursed by others)	4,234,059	[2] 4,520,194
Total	5,820,409	6,169,618
Total receipts and expenditures	151,238,514	211,082,476

[1] Expenditures are on an obligation basis.
[2] Includes transfer of funds from other Government agencies and departments.

Cash receipts distributed to States, Territories, and counties as directed by Congress (receipts of fiscal year 1957 except as indicated): [1]		
Payments to States and Territories (Act May 23, 1908), National Forests fund		[2] $26,975,307
Payments to school funds, Arizona and New Mexico (Act June 20, 1910), National Forests fund		105,474
Payment to Minnesota (Cook, Lake, and St. Louis counties) (Superior National Forest; Act June 22, 1948), National Forests fund		47,951
Payment to counties, submarginal land program, title III, Farm Tenant Land (Act July 22, 1937) (receipts of calendar year 1957)		558,249
Total		27,686,981
Internal equipment and supply services (working capital fund):		
Financed primarily by charges included above to Forest Service programs	$13,830,697	$13,308,717

[1] These are the amounts actually paid during fiscal year 1958, based on receipts for fiscal year 1957. Previous reports for these items have shown amounts payable based on receipts for the fiscal year covered by the report.
[2] Does not include approximately $2,671,299 due counties from fiscal year 1957 receipts on national forest O&C lands. This amount was included in transfer to Interior for distribution under Act of August 28, 1937 (50 Stat. 874) as amended.

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